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Stroke and non-compliance with the therapeutic regimen among hypertensive men and women in Gaza Strip

Thesis submitted to the University of Bielefeld in fulfillment of the requirement for the degree of Doctor of Public Health (Dr.PH.) at the School of Public Health, University of Bielefeld, Germany

Department of Public Health Medicine

Submitted by:

Yousef Ibrahim ALjeesh

Palestine

December 2003

Thesis Director:

Prof. Dr. Alexander Krämer, M.D., Ph.D.
Prof. Dr. Ulrich Laaser, M.D., Ph.D.

DEDICATION

To my mother, for her nurturing and inspiration

To my wife, for her love, support, patience, and understanding

And

To my children, Marah, Assel, Besaan, and Abdullah who have taught us

what really matters.

ABSTRACT

The purpose of this study was to ascertain whether an association exists between non-compliance with the therapeutic regimen (anti-hypertensive medication, dietary restrictions of sodium, weight reduction, exercise program, follow-up health care, and smoking), and development of stroke among hypertensive patients, and to determine the risk factors which contribute to the development of stroke. Also to evaluate the differences in quality of life among the patients with stroke and history of hypertension (case group), and hypertensive patients without stroke (control group) one year before the study, and to assess the existence of seasonal pattern and the occurrence of stroke. The study described in this thesis aims: first, to understand the relationship between non-compliance with the therapeutic regimen and development of stroke among hypertensive patients in Gaza Strip; second, to provide reliable information that might help improving the quality of life among hypertensive patients.

A pair-matched case-control study design was used involving a case group consisting of 112 subjects, who had been hospitalized for acute stroke with a history of hypertension in Gaza Strip during a 12 month period in 2001, and a control group consisting of 224 subjects (116 men and 108 women) who were matched by age, sex, period of duration of the therapeutic regimen, enrolment location, and with single history of hypertension (no other physical disease). A self-reported structured interview was used for data collection. Data and calculations were assessed using SPSS statistical system and SAS procedure PHREG. Descriptive statistics and frequency distributions were generated to

make a comparison between the case and control group regarding compliance with the therapeutic regimen, and seasonal pattern. Single logistic regression models (crude odds ratio), and multiple conditional logistic regression models were used to determine potential risk factors, which contribute to the development of stroke (medication not taking as prescribed, using excessive salt at meals, eating diet high in fat, no involvement in a regular program of exercise, smoking, and high level of stress). In addition, the same model was used to determine the interaction between high level of stress (HLS) and using excessive salt at meals, and smoking and development of stroke. To investigate differences in quality of life among case and control groups an analysis of variance one-way ANOVA was carried out.

We found that hypertensive patients who developed stroke (case group) were less compliant with the therapeutic regimen than the hypertensive patients who did not develop stroke (control group). Single logistic regression models (crude odds ratios) showed significant associations for stroke and several risk factors, such as medication not taken as prescribed (OR=7.13; 95%CI 3.32-15.32), excessive usage of salt at meals (OR= 6.21; 95%CI 3.75-10.29), eating diet high in fat (OR=4.66; 95%CI 2.87-7.56), no involvement in a weight reduction program (OR=4.97; 95%CI 1.72-14.36), no involvement in regular exercise program (OR=4.94; 95%CI 3.80-8.73), no follow-up physician or clinic (OR=3.03; 95%CI 1.8-5.1), and smoking (OR=2.20; 95%CI 1.33-3.62). Multiple conditional logistic regression models showed a significant association between the development of stroke and medication not taken as prescribed (OR=6.07; 95%CI 1.53-24.07), using excessive salt at meals

(OR=4.51; 95%CI 2.05-9.90), eating diet high in fat (OR=4.67; 95%CI 2.09-10.40), and high level of stress (OR=2.77; 95%CI 1.43-5.38). On the other hand no significant association between smoking and the development of stroke (OR=2.12; 95%CI 0.82-5.51) was found. Regular physical exercise appeared as a protective factor in our model (OR=0.26; 95%CI 0.12-0.57). The results of the multiple conditional logistic regression model based upon the backward selection procedure and considering interaction terms with two different stress levels showed significant interaction for using excessive salt at meals interacting with low level of stress (LLS) in relation to the development of stroke (OR=16.61; 95%CI 4.40-62.80). There was no significant effect of excessive usage of salt interacting with high level of stress (OR=1.76; 95%CI 0.58-5.33) in relation to the development of stroke. Smoking in interaction with low level of stress was a significant risk factor for stroke (OR=9.88; 95%CI 2.52-38.78), but a non-significant protective factor in interaction with high level of stress (OR=0.52; 95%CI 0.14-1.99). These results are discussed further.

The World Health Organization Quality of Life (WHOQOL–BREF) twenty-six items questionnaire was used in this study to measure the quality of life (QOL). This version produces a quality of life profile, and it includes four domain scores (physical, psychological, social relationships, and environment). The analysis of variance shows that the overall mean quality of life among the case group is lower than in the control group for both sexes at all domains as evidence given by F-value and level of significance ($p<0.05$). In addition, overall quality of life and in all domains is lower in our study than in the German general population.

Regarding the seasonal pattern and development of stroke, the data suggest evidence for winter and autumn as the main seasons associated with development of stroke.

The study gives clear evidence about the importance of pharmacologic and non-pharmacologic treatment in reducing the risk of stroke and resulting in an improvement of quality of life. More attention should be directed towards the development of an effective health education program in light of conception and misconception of the patients regarding illness and treatment at secondary and tertiary health care level based on sound theory. This program should focus on enhancing patients' compliance with the therapeutic regimen, improving health behavior, and modification of risk factors to decrease the incidence and mortality rate of stroke among hypertensive patients.

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Yousef Aljeesh

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GLOSSARY

ADL	Activity of Daily Living
ANOVA	Analysis of Variance
BMI	Body Mass Index
CDR	Crude Death Rate.
CES-D	Center for Epidemiological Studies Depression Scale
CI	Confidence Interval
CT	Computed Tomography Scan
CVA	Cerebrovascular Accident
DALYS	Disability Adjusted Life Years.
DBP	Diastolic Blood Pressure
DF	Degree of Freedom
F test	Fisher test
GDP	Gross Domestic Product
HBM	Health Belief Model.
HLS	High level of stress
HRA	Health Risk Appraisal.
IMR	Infant Mortality Rate.
LLS	Low level of stress
MMOL	Millimole
MOH	Ministry of Health
NSAIDS	Non Steroid Anti-inflammatory Drugs.
OR	Odds Ratio
PA	Palestinian Authority

PCBS	Palestinian Central Bureau of Statistic
PHC	Primary Health Centers.
PICH	Primary Intracerebral Hemorrhage.
QOL	Quality of Life.
RR	Relative Risk
SAH	Subarachnoid Hemorrhage
SBP	Systolic Blood Pressure
SHEP	Systolic Hypertension Elderly Program
SPSS	Statistical Package of Social Science
Sq.km²	Square Kilometers
SSB	Between-groups Sum of Squares
SSW	Within-groups Sum of Squares
UNICEF	United Nations International Children's Fund
UNRWA	United Nation Relief and Works Agency.
US	United State.
WHO	World Health Organization
WHOQOL	World Health Organization Quality Of Life

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Chapter 1

Introduction

This dissertation is not intended to be a comprehensive study on stroke, but it is intended to ascertain whether an association exists between non-compliance with the therapeutic regimen and development of stroke, and to determine risk factors, which contribute to the development of stroke. In addition, I would like to evaluate the differences in quality of life among the patients with stroke and history of hypertension (case group), and hypertensive patients without stroke (control group) one year before the study and to assess the existence of seasonal pattern and occurrence of stroke.

A stroke is "the result of damage to part of the brain caused by an interruption to its blood supply". There are many words and phrases, which mean the same as stroke: these include "apoplexy, shock, cerebral infarction, cerebral thrombosis, cerebral hemorrhage, and cerebrovascular accident or CVA". A stroke is either caused by bleeding into the brain from rupture of a cerebral blood vessel or by blockage of an artery caused by blood clot. [1]. Hypertensive patients are more likely to suffer a stroke than those whose blood pressure is normal, but many people with hypertension do not have strokes, and other people who suffer a stroke do not have history of hypertension, so obviously hypertension is not always to blame. Hypertension is a risk factor for stroke, which is the reason why it is so important for high blood pressure patients to have antihypertensive medication. There are many elements such as smoking, overweight, and poor diet may increase the risk of stroke. Undoubtedly, stroke constitutes the most common disabling and lethal

neurological disease of adult life, because it affects the brain, which controls out thoughts, feelings, memory, and imagination [2]. Non-compliance with the therapeutic regimen is a significant problem among hypertensive patients. It is estimated that 51% of the hypertensive patients stop their anti-hypertensive medication within one year of its initiation [3]. The association between blood pressure and non-compliance with the therapeutic regimen and development of stroke has been investigated in several major studies. In addition, knowledge of life style modifications for stroke development is important in terms of prevention. For such reasons it is obvious that improved therapeutic activities such as exercise, weight reduction, stop smoking, and control blood pressure are required.

Our goal in this thesis is to understand the relationship between non-compliance with the therapeutic regimen and development of stroke among hypertensive patients in Gaza Strip; second, to provide reliable information that help in improving the quality of life among hypertensive patients. This work will be a useful reference for doctors, nurses, and related health care professionals who practice their disciplines in this large and expending field. This thesis emphasizes the importance of compliance with the therapeutic regimen among hypertensive patients to prevent stroke development and to use the results and findings of this thesis in clinical practice. We hope this study will increase awareness of the knowledge for all heath care providers to facilitate the movement of other study into the mainstream of patients care. This dissertation is organized into 11 chapters, and the content of these chapters are designed to assist the importance of compliance with the

therapeutic regimen in preventing dangerous disease outcomes. Chapter 1 is provides an introduction about the important of the subject. Chapter 2 provides knowledge about Global and significance of the problem, epidemiological view of the problem, and evidence of intervention. Chapter 3 stresses the importance of the Health Belief Model to enhance the patient's compliance with the therapeutic regimen. This enhances the understanding of the severity and seriousness of the consequences, if the problem will be left untreated. Chapter 4 is designed briefly to introduce socio-cultural background, health situation, and health system in Gaza strip. Chapter 5 provides a background of the study and summary of the literature review regarding compliance with the therapeutic regimen, and it is effect on patient quality of life. Chapter 6 introduces the research problems, aims, objectives, and hypotheses of the study. Chapter 7 focuses on study design, period of the study, setting, study population, sample and sampling, exclusion criteria, data collection, questionnaire, anthropometric assessment, ethical considerations, and analysis of data. Chapter 8 introduces the results of the study. Chapter 9, 10, and 11 discusses the importance of the study, and provides specific guidelines, conclusion and recommendations for using the results finding in clinical area.

This research creates hope among all health care providers that this problem can be controlled by a comprehensive health education program, and follow-up health care. One of the major reasons we took on the challenge of doing this study was to illustrate, provide, and introduce to all health care providers

the importance of compliance with the therapeutic regimen in stroke prevention.

Chapter 2

General Background

2.1. Global burden of the problem

According to Disability Adjusted Life Years (DALYS), cerebrovascular disease in 1990 was the sixth leading cause of DALYS, but they expected to be the fourth leading cause of DALYS in the year of 2020, after ischemic heart disease, unipolar major depression, and road traffic accidents. According to the 15 leading causes of death in the world, cerebrovascular disease was the second leading cause of death in 1990, but they expected to be the second leading cause of death in the year of 2020 as well, after ischemic heart disease. According to Global Burden of Disease, cerebrovascular disease (first-ever stroke) is classified to be (IIG31) [11].

2.2. Significance of the problem

During the recent years and based on my observation, hospitals and Palestinian Annual Report, stroke is a serious problem in Palestine, and it needs a special and extensive care. According to the Palestinian Annual Report 1997, the mortality rate among cerebrovascular disease between (20-59) years old is high in comparison with other diseases, and it accounts 10.1%. Also the mortality rate among cerebrovascular disease over 60 years old is high in comparison with other diseases, it accounts 17.8% [10].

The status of health in Palestine in 1999 showed that the mortality rate among cerebrovascular disease in males between (15-59) years old is high in

comparison with other diseases and it accounts 6.8%. The mortality rate in females with the same age also is high, and it accounts 10.6%. The mortality rate among cerebrovascular diseases in both males and females between (60-75) years old are high and they account 15.6% [4]. Few data exist and no previous studies have been located in the literature about compliance, awareness, knowledge, misconception, and management of hypertension and stroke diseases in Gaza Strip. In addition, there are no previous studies talked about how hypertension and stroke diseases affect patient's quality of life, despite the assessing quality of life in people living in Gaza Strip is very important, because they are at high-risk situation such as political instability, malnutrition, poverty, and low health resources.

This study is considered the first step to initiate epidemiological data base necessary for improving health status, increasing life consistency, preventing complications, providing health prevention, promotion, curative, and restoration for hypertension and stroke in Palestine. WHO expert committee (1996) reported that prevention of stroke by anti-hypertensive therapy has been successful, but more research is required to evaluate the effectiveness of anti-hypertensive therapy and lifestyle modification in preventing various types of stroke and recurrent stroke [12].

2.3. Epidemiological view of the problem

Hypertension is a major public health problem in the world affecting about 20% of the adult population, which accounts for 25-50% of all deaths [12]. Hypertension alone is responsible for over 70% of stroke in women, and 40% in men [13]. The relation between the incidence of stroke and blood pressure is continuous and particularly steep. All types of stroke (hemorrhagic, lacunar and thrombotic) are associated with hypertension, and anti-hypertensive agent is effective in decreasing the incidence of stroke by about 40% [12]. WHO and consensus of medical opinion reported that the prevalence of hypertension is about 25% and 60% among elderly people, but it has been demonstrated that there will be a decrease of 39% in strokes following anti-hypertensive medication among elderly people over age of 60 [14].

Currently it is estimated that 50% of white women and 79% of Afro-American black women over the age of 45 years are hypertensive and the prevalence of hypertension for all women over 65 years of age is 70% compared with 40% for men [13]. Higher level of blood pressure and a higher prevalence of hypertension are more common among people with low socio-economic status in countries that are in the post-transitional stage of economy. Some geographical diversity has been noted in industrial countries reporting higher prevalence rates of hypertension than most developing countries. Differences between urban and rural areas have been reported in some developing countries, with higher prevalence estimates in urban communities. Ethnic differences, such as higher prevalence rates in blacks than whites, have been reported from some countries [12]. Hypertension is the single most important,

common, and potent risk factor for stroke [15, 16, 17, 18, 19], and one of the main causes which contributes to disability, health care costs, and stroke mortality [20]. Kuller has said in a recent article in the European Journal of Epidemiology that "The most important challenge of the new century will be the prevention of hypertension, and if the people in the world could maintain their blood pressure within the normal range, it is likely that stroke no longer would be a major public health problem" [21]. Stroke is still a major and formidable public health problem, leading to life threatening neurological disease, death, and disability [16, 22, 23, 24, 25, 26]. Blood pressure should be maintained within normal level, because subjects with diastolic blood pressure (DBP) of 105 mmHg have a ten-fold increase in the risk of stroke compared with those with DBP of 76 mmHg [27]. Untreated hypertension increases the risk of vascular damage involving both small and large arteries, which in turn lead to cerebrovascular morbidity and mortality [28]. A major challenge to epidemiology and prevention research in the 21st century will be the prevention of neuralgic damage of the brain directly related to stroke [22].

Hypertension is the main risk factor for both primary interacerebral hemorrhage (PICH) and ischemic stroke. The relative risk for hypertensive patient suffering PICH is as high as 3.9 compared with normotensive patients, and 40-60% of patients with PICH have hypertension [29]. Hypertension is one of the most common medical conditions for which Americans seek health care, and a large body of evidence shows that decreasing blood pressure to normal range can effectively lower stroke, coronary artery disease, and over all mortality [30]. Hypertension affects almost 50 million people and places

them at a higher risk for cerebrovascular diseases [31]. Some studies provide an evidence of a greater increase in stroke risk due to hypertension among people with additional risk factors such as obesity [32], inactivity [33], current smoking [34]. Others showed that increased levels of physical activity is a significant protective factor in men, but not in women [35], The development of stroke does not only depend on obesity and fat, but is related to the location of fat (e.g. abdominal obesity, and extremities such as hands and legs) [36]. AS a main cause, hypertension alone is responsible for over 70% of strokes in women and 40% in men. Compared with normotensive women, hypertensive women are three times more likely to suffer a stroke. A 7.5mmHg difference in diastolic blood pressure increases the risk of stroke by 46% in both sexes, and women aged 35-64 years with systolic blood pressure of >180mmHg have a five fold increased risk of stroke compared to normotensive women, and the risk is increased four fold in those over 65 years of age [13].

Cross-Sectional and prospective studies showed that there is a strong and consistent relationship between weight and blood pressure. [37]. Experimental as well as observational studies showed that an increase of sodium chloride intake more than requirements, is associated with increase in blood pressure [38]. During the period of follow up care, sedentary and unfit normotensive individuals have a 20-50% increase risk of developing hypertension when compared with more active and fit peers [39].

2.4. Evidence of intervention

Hypertension is a risk factor for initial stroke, but its relation to stroke recurrence is unclear [40]. In the United States stroke is the third leading cause of death. Yearly about 600,000 people suffer a new or recurrent stroke, 500,000 of first attacks and 100,000 are recurrent attacks. Every 53 second, some one in the United States suffers a stroke and every 3.3 minutes someone dies of one. In addition, 158,448 people died in 1998 due to stroke, which accounted about one of every 14.8 deaths [41]. In Germany in 1992, about 12% of all deaths were from cerebrovascular diseases and the crude incidence of cerebrovascular diseases is not precisely known, but is estimated to be 150-180 new stroke cases per 100,000 per year, taking in consideration the transient ischemic attacks were excluded [42].

In western industrialized societies, stroke is the third leading cause of neurological deficit and death [43]. In Australia, yearly there is more than 40,000 people suffer a stroke [44]. In developing countries, stroke remains one of the major public health problems, and any intervention, which prevents the development of stroke, is of a major importance [25]. In Gaza Strip and West Bank, cerebrovascular disease is considered to be the second leading cause of death of the total cardiovascular disease mortality and it is more among female than male. The mortality rate of cerebrovascular disease among people of 60 years and older is 15.2 in comparison with other diseases such as hypertension disease 11.3, malignant neoplasm's 9.1, diabetes mellitus 5.3, and renal failure 3.2 [5].

Chapter 3

Theoretical framework of the study

Health Belief Model

Health belief models (HBM) is the most sophisticated model has recently been used to compliance behavior, and identifying the risk factors for non-compliance [45]. A group of social psychologists collaborated in the development of the HBM in the early 1950 [46]. It is the most influential and intensively researched theory of motivation related health behaviors [47]. This model is frequently used by health educators in health behavior applications in order to predict, describe, and explain health related behavior based on person's perception and belief patterns [48]. It is successfully used as the theoretical basis for a number of research studies, with the theory applied to health related areas such as control of hypertension [49].

HBM included four major dimensions, which are perceived susceptibility, severity, benefits, and barriers. Perceived susceptibility concerns the client's subjective perception and understanding the risk of incurring a health–related problem. Perceived severity concerns the client's belief of how serious a condition and its consequences are. Perceived benefits concern the clients outcomes benefit, if he understand the severity of the problem, and it is very important, to encourage the clients to accept the health related advice. Perceived barriers concerns the client's engagement in a kind of cost-benefit analysis such as perceived benefits must outweigh

perceived cost, and whether the change is seen more as expensive, dangerous, painful, and upsetting [46]. Numerous studies indicate that the HBM can predict intentions to practice health related behavior [47].

Damrosch in the "general strategies for motivating people to change their behavior" article said that “Dinicola" and "Diaatteo" concluded the HBM is important, because it specifies individual components of global patterns of belief and focus attention on individual factors that are amenable to change” [50]. In addition, the health belief and attributions have also been considered as important determinants of regimen compliance. Krasnegor et al. in "developmental aspects of health compliance behavior" shows in a study conducted by (Sanders, Mills, and Horne, 1975) that the health believes are significant predictors of both regimen compliance and metabolic control. In addition, those who believed their self-care behaviors could result in decreased probability of long-term complications were more likely to engage in appropriate self-care behavior [51].

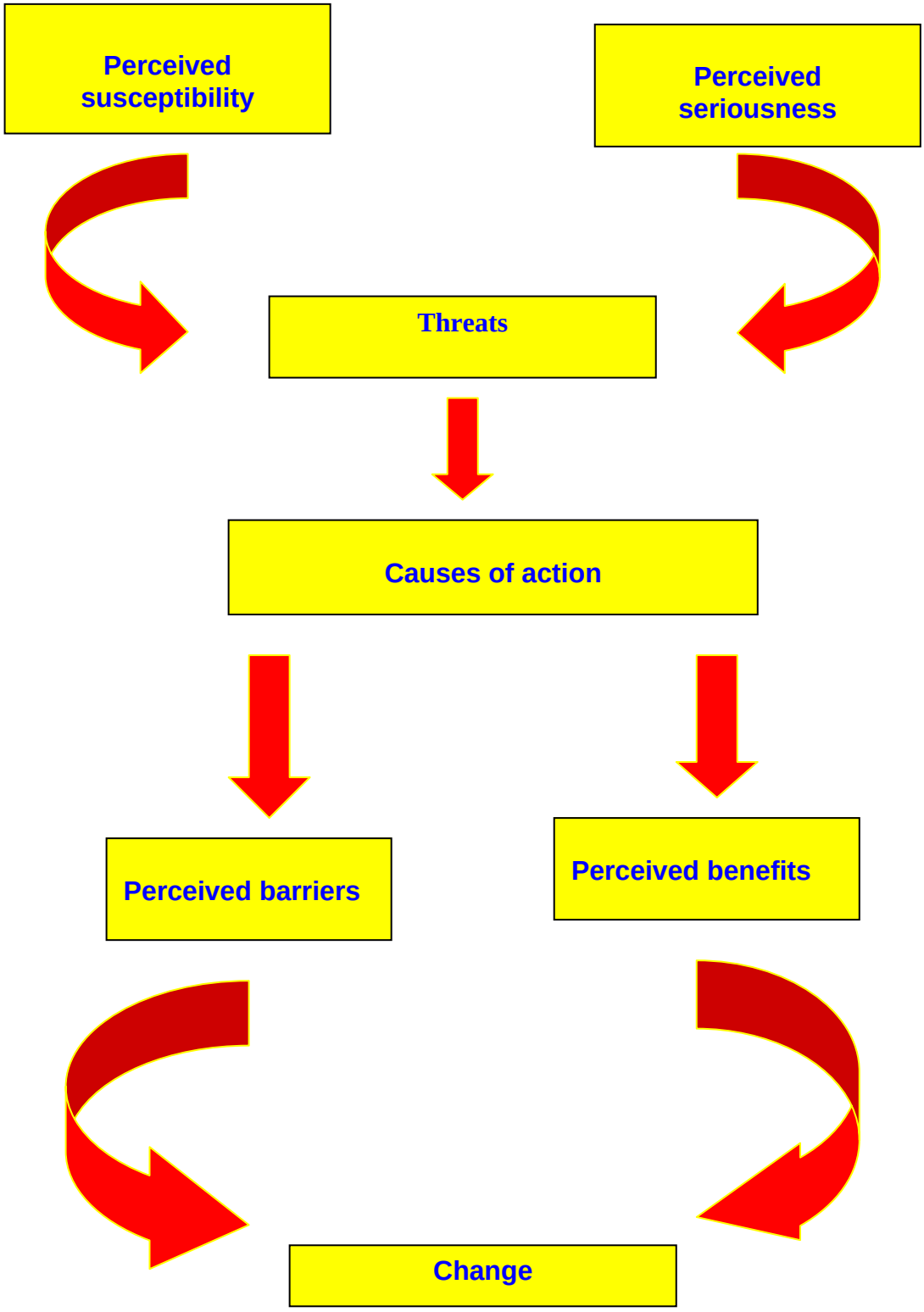


Figure No. (1): Health Belief Model

Chapter 4

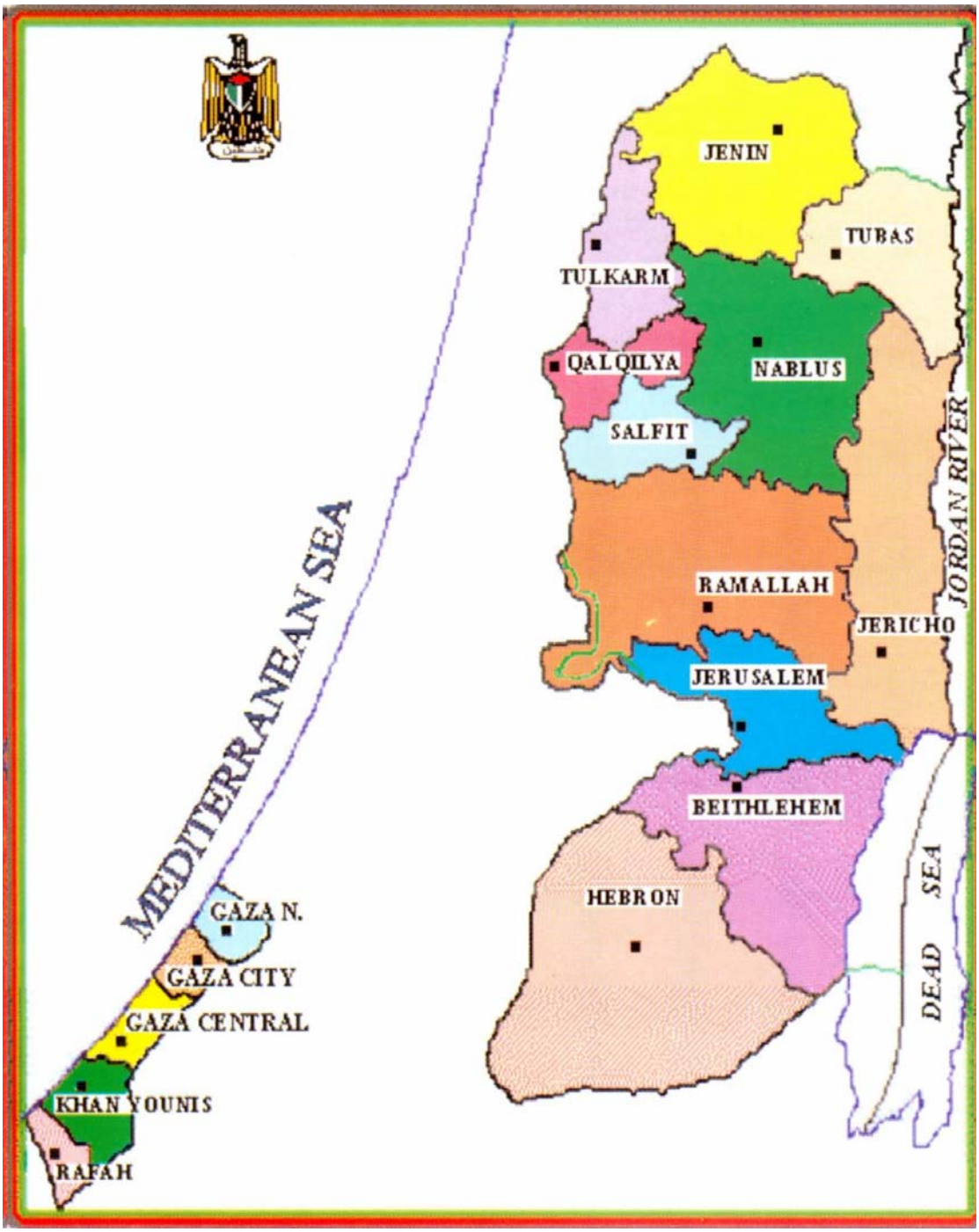
Region of the study

Gaza Strip

4.1 Region profile and socio-cultural background

The Palestinian territories comprise two areas: the West Bank (consist of ten provinces in the north) and Gaza Strip (consist of five provinces in the south). West bank lies within an area of 5,800 square kilometers (sq.km²) west of the river Jordan. The north provinces are Jenin, Tulkarem, Qualqilya, Salfit, Nablus, Ramalah, Jerusalem, Jericho, Bethlehem, and Hebron. Gaza strip is an overcrowded area with an area 360 sq.km² and lies on the coast of the Mediterranean Sea. The population in Gaza strip is mainly concentrated in the cities, and it is divided into five governorates: Gaza north, Gaza city, Mid-zone, Khan-Younis, and Rafah. Within these five governorates, there are small villages and eight refugee camps.

The population of Palestine in the year of 2000 was estimated at 3,150,056 inhabitants, 1,590,945 (50.5%) are males and 1,559,111 (49.5%) are females. In Gaza strip, the population size is estimated at 1,138,126 about 36.1% of total population in Palestine. Out of which 573,853 (50.4%) are males and 564,273 (49.6%) females. More than 16% of the population resides in the north of Gaza, 52% in the central area and the people in both areas are mainly treated at Shefa hospital. Nearly 32% of the population resides in the southern area and they are mainly treated at Nasser, and European hospital [4].



Political map of the Gaza strip and West Bank that lies under the control of the Palestinian authority (PA)

(Annual report, 1999)

The density rate in Gaza Strip is very high 3,161 inhabitants per one square kilometer, compared with West Bank 342 inhabitants per sq.km², and neighboring countries like Jordan and Lebanon. Some parts of the Gaza land is still occupied by Israeli settlements, which make the problem of density more badly. Figure 2 shows the population pyramid in Palestine, it is estimated that 50.2% from the Palestinian population are less than 15 years (23.8% male, and 23.1% female). Up to the age of 50 years, there is gender predominance towards males, then gender predominance towards females. The ages 60 years and over is constitutes (4.7%) of population and this is mainly due to short life expectancy [5].

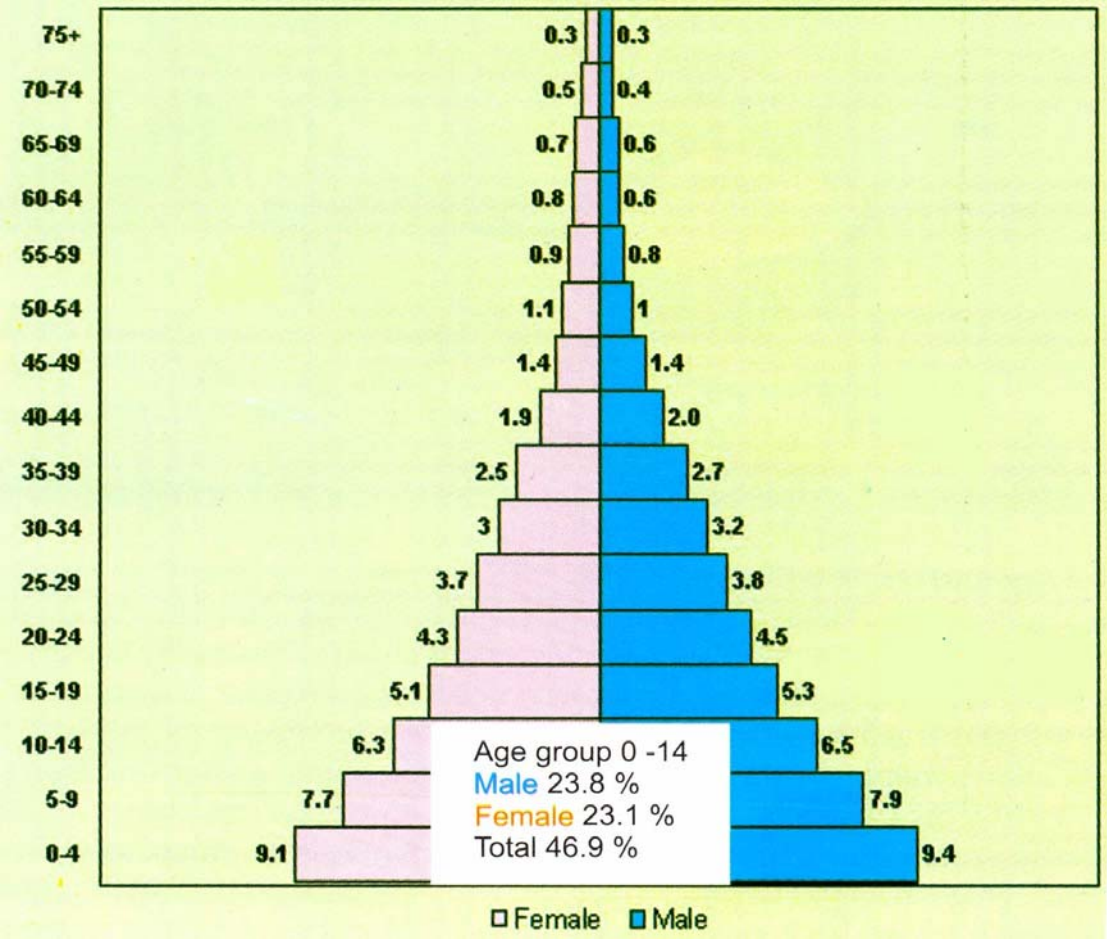


Figure No. (2): Distribution of population by age and sex in Palestine (Annual Report, 2000)

Gaza Strip lies among the poorest countries in the world with a Gross Domestic Product (GDP) of 1,315,845 $ per capita, while the Gross national product showed 1,367,9 million in 1998. The unemployed increases and the number of workers in Israel decreased in the year of 2000 and 2001 compared with year of 1999 due to unstable political situation and occupation's practices such as closure of Palestinian region and cities. The economy in West Bank and Gaza Strip has been struggling to recover from the shock of the collapse of the Israeli bloc, as the industrial and productive infrastructure had heavily been dependent on the Israeli support [6].

4.2. Health situation

The heath situation of people in the Palestinian territories is deteriorating as the escalation of the conflict compounded by further border closure and curfew throughout the West Bank and Gaza Strip. There are too many restrictions on population movements, which hinder the delivery of health care services. Many factors affecting the health status in Palestine such as damage of commercial and social infrastructure, lack of human waste disposal, damage to water supply, and problems with getting ride of solid waste materials, may lead to spreading of parasitic infection. Disposal of solid waste products is still one of the main environmental health problems in Gaza Strip, and West Bank since September 2001 due to occupation, and improper handling of solid waste, which can be filtrated to the water pipelines leading to deterioration of water quality, and air pollution. During the new uprising, the Palestinian ministry of health (MOH) reports that, its facilities operate at about 30% of capacity because of closures and curfews, and restrictions of access

continue to prevent Palestinian requiring medical treatment from accessing care services. Harlem, G. in the "health situation of Palestinian people living in the occupied territory" reported that two recent surveys carried out by different organizations showed that half of young children (6-59 months) and women of childbearing age are anemic. The second survey was carried out by the Palestinian Central Bureau of Statistic (PCBS) and United Nations International Children's Fund (UNICEF) of 3,684 children and 6,204 women showed that 49.5% of children have a hemoglobin level below 10.9 and 45.4% of non-pregnant women have a hemoglobin level below 11.9. The Palestinian water resources may be the most crucial environmental problem facing the Palestinian Authority. The water supply delivered for the Palestinian people living in the occupied territory is scarce and deteriorated in both quality and quantity, which will impose a public health hazard due to destruction of water network and sewage pipelines. Especially the water delivered from water tankers is unsafe and it is below the standard level set by the world health organization (WHO). Other key health concerns is an increase number of injured and disabled people due to Israel and Palestinian conflict, which are in need for long term care regarding their physical problems [7]. The crude death rate (CDR) for Palestine declined from 3.6 per 1000 population in 1996 to 3.35 per 1000 population in 1999. In Gaza Strip, it declined from 3.6 per 1000 population in 1996 compared to 3.4 per 1000 population in 1999. The Infant mortality rate (IMR) in Palestine is about (15.5 per 1000 live births). Gaza north governorate reported the highest IMR (29.6 per 1000 live births), but Bethlehem in the West Bank reported the lowest IMR (7.0 per 1000 live births). In Gaza Strip, 23.8% of infant deaths occurred at governmental

hospitals, out of which 32.1% in the first week after delivery. The major causes of infant's death are prematurely 18.6%, congenital anomalies 14.9%, sudden infant death syndrome 8.1%, blood sepsis of the newborn 6.5%, and pneumonia 6.4%. The highest mortality rate is among elderly people, who are over 65 years (44.7 per 1000) population, and the lowest mortality rate is among the people between 5-14 years (0.22 per 1000) population. The main causes of death among male between the ages of 15-59 years are acute myocardial infarction 18.7%, cerebrovascular diseases 6.8%, road traffic accident 6.4% and heart failure 6.4%. The main causes of death among female between the ages of 15-59 years are cerebrovascular disease 10.6%, breast cancer 8.4%, acute myocardial infarction 7.7%, heart failure 7.4%, renal failure 5.9%, and hypertension disease 4.1%. In addition, the main causes of death over 60 years of old are cerebrovascular disease 15.6 %, heart failure 12.6%, acute myocardial infarction 12.1%, senility 11.7%, hypertension 7.6%, diabetes mellitus 4.5%, chronic ischemic heart disease 4.1% and renal failure 3.6% [4].

4.3 Health care system

The health care system during occupation is characterized by the poor and inadequate delivery distribution of health services in term of quality and quantity. In 1967, Gaza Strip came under the military occupation of Israel, the structure of the health system and policies were managed by Israel government [8]. The infrastructure of the health system was destroyed due to the Israel government's lack of interest to perform any investment in the occupied territories heath system [9]. A great improvement and development

of health services such as human resources, infra structures, policies, and regulations have taken place after Oslo agreement in 1993 between Israel and Palestinian leaders.

4.3.1. The health services in Gaza strip

Three main health providers today provide the health services in Gaza Strip:

1. The Palestinian Ministry of Health (MOH)

It has the authority of supervision, regulation, licensure, and control for whole health services. There are 45 health centers in Gaza strip under the supervision of (MOH), 39 primary health care centers, and 6 hospitals. Table 1 shows the distribution of manpower and the six governmental hospitals in Gaza strip, which are Shefa Hospital with 461 beds, Khan-Younis (Nasser) hospital 239 beds, European Gaza Hospital 240 beds, Pediatrics Hospital 126 beds, Ophthalmology Hospital 31 beds, and Psychiatry Hospital 39 beds.

Table (1): Manpower in governmental hospitals in Gaza Strip

Hospital	Beds	Physicians	Nurses	Technicians
Shefa	461	272	378	91
Khan-Younis (Nasser)	239	144	216	47
European	240	-	-	-
Pediatric	126	62	94	26
Ophthalmology	31	13	26	2
Psychiatry	39	7	22	3

(Annual report, 1997)

Note: - European hospital established to work on the year of 2000, but right now, we have 240 beds, 140 physicians, 180 nurses, and 40 technicians are working in this hospital.

2. United Nations Relief and Works Agency (UNRWA)

It operates 17 primary health care centers, covering all the eight refugee camps in Gaza Strip.

3. Non-Governmental Organization (NGO)

It operates many mini primary health care clinic, hospitals, and rehabilitation centers.

The main goals of primary health centers (PHC), and hospitals in the all sectors are to provide preventive, curative, and rehabilitative services to maximize health and well being. The budget for the governmental health sector increased from 61,976,000 $ in 1993 to 97,934,000 $ in 1997. The expenditures of the Palestinian MOH were 42% for salaries, 30% for medications, and disposable materials, 14% for operating expenditure and 14% for treatment a broad [10].

Chapter 5

Literature review

Risk factors can be considered as different variables or conditions that play an important role in the occurrence of disease. Among extensive studies dealing with risk factors for stroke, there have been conflicts that may be attributed to different opinions on risk factors or to different methodologies to determine risk factors. Stroke comprises several potential risk factors, which would be appropriate to talk and clarify each one of them.

5.1. Hypertension and stroke

Hypertension is a major worldwide public health problem, and the world health organization (WHO) started to pay more attention to the management and control of hypertension to reduce the mortality rate from the circulatory system diseases [57]. The observational and experimental epidemiological data indicate that 6-mmHg decreasing in diastolic blood pressure associated with 40% decrease in fatal and non-fatal stroke rate in relative terms [15, 58, 59]. The Framingham Heart Disease Epidemiology Study, which is considered the first and longest running prospective population based study about the determinants of cardiovascular morbidity and mortality, has provided much of the epidemiological evidence incriminating hypertension as the most important modifiable risk factor for stroke [60]. The results of prospective studies and clinical trials show that the risk of stroke will be decreased by controlling of mild, moderate, and sever hypertension in all age groups [61]. Changing in blood pressure can leads to stroke. In case of hypotension, the patient will have cerebral ischemia and in case of hypertension the patient will have,

cerebral hemorrhage. The incidence of stroke among hypertensive patients is seven times greater than in normotensive patients. Ozer M et al. in the Management of persons with stroke book shows in a follow up study conducted about a group of patients with hemiplegia and control blood pressure (control group), and another group with poor control blood pressure. A significant lower in developing a second stroke among control blood pressure group in comparison with poor control (5% versus 28% with poor control) [62]. Alter et al., 1994 conducted a study about hypertension and risk of stroke recurrence. A cohort study was used with 662 patients with initial stroke. Hypertension was determined by history and measuring blood pressure at each follow-up at 4-to 6 month's intervals for up to 48 months. History of hypertension, measured blood pressure and its control were analyzed in relation to stroke recurrence frequency using Kaplan-Meier and unvaried, multivariate, and time-dependence Cox proportional hazards models. The result of the study showed, the patients with a history of hypertension had a significantly higher stroke recurrence rate than those without such a history (P=.01). Recurrence risk showed a reduction in a multivariate analysis as quality of diastolic blood pressure control increased (relative risk=8.4, 3.9, and 2.0 among those with poor, fair, and good control, respectively, compared with non-hypertensive subjects. The conclusion of the study was a history of hypertension and elevated measured diastolic pressure after the initial stroke were associated with an increased risk of second stroke and Controlling diastolic pressure substantially reduced this risk [40].

Prospective Nurses Health conducted a study to show the relation of self-reported high blood pressure and subsequent development of coronary heart disease and stroke among 119, 963 women between the age of 30 to 55 years old and who had no previous diagnosis of angina, myocardial infarction, and stroke. Participants in the Nurses Health Study reported high blood pressure and other cardiovascular risk factors on baseline questionnaires mailed in 1976. The results of the study during 6 years of follow-up showed that, there were 308 incidence cases of coronary heart disease (66 fatal and 242 non-fatal myocardial infarction), and 175 strokes (50 fatal and 125 non-fatal). Fatal as well as non-fatal coronary heart disease and stroke were all significantly more frequent among the women who had reported high blood pressure. After adjusting simultaneously for age and other risk factors, the relative risk was 3.5 (95%CI 2.8-4.5) for total coronary heart disease and 2.6 (95%CI 1.8-3.5) for total stroke. This association was evident at all levels of relative weight. The results emphasize the importance of high blood pressure as an independent predictor of coronary heart disease and stroke in middle-aged women and suggest that, the increased risk occurs in both lean and obese women [63].

Teunissen et al. conducted a study about risk factors for subarachnoidal hemorrhage (SAH). Medline search from 1966 to 1994 and search of the reference lists of all relevant publications were used to identify relevant studies. Studies were included only if they fulfilled predefined methodological criteria. Case-control studies were included if the diagnosis of SAH was proved by computed tomography scan (CT), angiography, or autopsy in at

least 70% of patients. Longitudinal studies were included if the criteria for SAH were based on a review of the medical records. Nine longitudinal studies and 11 case-control studies were included. The result showed that smoking (Relative Risk [RR]=1.9; 95%CI 1.5-2.3 for longitudinal studies, Odds Ratio [OR]=3.5; 95%CI 2.9-4.3 for case-control studies. Hypertension (RR=2.8; 95%CI 2.1-3.6; OR=2.9; 95%CI 2.4-3.7), and drinking 150 gram or more of alcohol per week (RR=4.7; 95%CI 2.1-10.5; OR=1.5; 95%CI 1.1-1.9). Use of oral contraceptive, hormone replacement therapy, hypercholesterolemia, and physical activity were not significantly related to the risk of SAH. We conclude that smoking, hypertension, and alcohol abuse are important risk factors for SAH. Reduction of exposure to these risk factors might result in a decrease incidence of SAH [64].

A blood pressure survey was arranged in the city of Bergen, Norway, to show the relationship between blood pressure and 20 years of mortality among 52,064 subjects, 21,367 men and 30,697 women between the ages of 30 to 89 year. These subjects were followed from January 1, 1964 until death. Both systolic and diastolic blood pressures were measured twice and the second measurement was used in the analyses. The relative risks was calculated by the ratio of mortality in the group with high blood pressure to that in the group with lower blood pressure (systolic pressure $\geq$ 160mmHg vs. Systolic blood pressure < 160mmHg and diastolic blood pressure $\geq$ 95mmHg vs. Diastolic pressure < 95mmHg). The results of the study showed, increased blood pressure was related to increase in mortality from stroke, and coronary heart disease at all age groups. Long linear relation was seen between systolic

blood pressure and the mortality of both stroke and coronary heart disease among men and women. More deaths were diagnosed as stroke in comparison with coronary heart disease among oldest groups of women, and there was an increase in the mortality rate of stroke with an increasing systolic blood pressure among men and women [65].

5.2. Compliance with the therapeutic regimen

Compliance with the therapeutic regimen is the main goal of health care professionals in hypertensive treatment. The treatment of hypertension is started nowadays with non-pharmacological therapy through a modification of lifestyle such as weight reduction, increase physical activity, moderation of dietary sodium and fat, limited alcohol intake and avoidance of stress [66]. Non-compliance with the therapeutic regimen such as (anti-hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, and smoking) is usually the main cause of hypertensive complications and mainly stroke. Edward DF, 1999 conducted a study included 400 patients were randomly assigned either to various compliance promoting interventions or to no intervention by using the therapeutic regimen. The result showed the mortality was 75.3% less in the experimental group than in the control group. The blood pressure was controlled in 65% of the experimental group compared with only 22% of the control group [67].

5.2.1. Anti-hypertensive medication

Nowadays the proper and successful management of hypertension is through three steps, which are anti-hypertensive medication, sodium restriction, and weight reduction [68]. Veterans Administration Cooperative Study showed the treatment of moderate and severs hypertension by anti-hypertensive medication (thiazide, and reserpine) reduce hypertensive complications in general, and stroke mortality by 50% [69]. Anti-hypertensive agents have been clearly shown to prevent both cerebral hemorrhage and cerebral infarctions [29]. Several clinical trials and recent meta-analysis suggested that anti-hypertensive medication are directly and clearly evidence reduced the risk of stroke development [70]. The prevention of stroke by anti-hypertensive therapy has been successful, but more research is required to evaluate the effectiveness of anti-hypertensive therapy and life style modification in preventing previous types of stroke and recurrent stroke [12].

Uncontrolled hypertension continues to be a major unresolved health problem. Kotchen et al. conducted a study to assess hypertension control, and medical care use among high-risk African Americans households in Milwaukee's inner city. A random sample of 583 subjects from 438 households over the age of 18 was selected. In this study, logistic regression analysis and interview were used. The interview includes questions to assess history of hypertension, use of anti-hypertensive medications, use of health care services, and household income level. Subjects with hypertension were defined as those with systolic blood pressure of 140 mmHg and/or diastolic blood pressure of 90 mmHg or higher or who were currently taking anti-hypertensive medications. The results

of this study showed that fourty two percent of the respondents were hypertensive. Blood pressure was uncontrolled in 74% of hypertensive persons, although 64% of hypertensive persons reported having seen a physician within the previous three months. Seventy percent of the hypertensive respondents had previously been informed of their hypertension by physicians, and 76% of women were aware of their hypertension in comparison with 60% among men (P<.01). Fifty- five percent of the hypertensive individuals reported taking anti-hypertensive medication. Sixty two percent of women were taking anti-hypertensive medication in comparison with 43% among men (P<.003) [71].

Both systolic and diastolic blood pressure are correlated with age, until age of 50, after that systolic blood pressure continue to increase with age, but diastolic blood pressure did not increased. Now they believe that isolated systolic hypertension raises the risk of cardiovascular disease as (coronary heart disease, left ventricular failure, and stroke) in both middle and old age. In addition, systolic hypertension is considered to be a predictor for both morbidity and mortality than diastolic pressure in these age groups. Systolic Hypertension Elderly program (SHEP) in 1991 conducted a study to investigate the importance of anti-hypertensive medication in the treatment of systolic hypertension by using double blind clinical trial design to treat systolic hypertension. The subjects were divided into two groups. The first group had anti-hypertensive medication such as chlorthalidone and sometimes atenolol or reserpine if needed, and the second group had placebo. The subjects followed for four to five years. The results of the study showed that, there was

36% decrease in stroke, 25% decrease in coronary heart disease, and 45% decrease in left ventricular failure in the participants treated with chlorthalidone or other drugs [72].

Anti-hypertensive medication is very important in controlling blood pressure, and it was shown to be significantly decreasing the mortality rate of hypertensive complications such as stroke [45]. The side effect of anti-hypertensive medications is the major reason for non-compliance to the therapeutic regimen, and the price that the patient should pay to normalize his blood pressure [57].

Recent surveys have shown that fewer than 30% of hypertensive patients benefit from treatment, because of lack of compliance with medical advice, despite convincing evidence that anti-hypertensive medication prevents premature death and suffering from such devastating complications as stroke and heart attack. The most common problem that faces the health care provider and lead to dissatisfaction is inability to improve patient's compliance, and inability to understand why the patient did not comply with the therapeutic regimen [73]. Phillips, 1988 in "patient compliance (new light on health delivery system in medicine and psychotherapy)" book said that Addington (1979) remarked: “Patient compliance with drug therapy for chronic disease is poor. Poor compliance has been documented in the long term management of hypertension and diabetes mellitus, in rheumatic fever prophylaxis, as well as in tuberculosis” [169]. Stunkard says: “Adherence to medical treatment is a major problem in modern medicine. No more than 50% of the patients adhere

to long term programs of diet and drugs" [166]. Azrin and Powel showed that "A major problem in outpatient treatment has been the extreme irregularity with which patients use medication prescribed for them" [167]. Stone et al. "Estimate one- third to one half of patients from different medical regimens fail to follow fully the treatment prescribed" [168]. Sackett and snow also observed, "Compliance declines quickly in the treatment course even among short-term regimens, and only about one-half or fewer patients stay with long term compliance" [74].

5.2.2. Exercise program

Exercise plays an important, and significant role in controlling blood pressure, improve lipid (cholesterol, and fat) profile, decrease blood clot formation, increase clot removal, and decrease obesity [75]. Several studies reported that physical activity decreases the risk for thromboembolic stroke among older nonsmoker persons, and reduces the risk of cerebral hemorrhage [76, 77, 78]. Dishman, 1994 in "advances in exercise adherence" book said that Salonen et al., 1982 reported a statistical significance between low physical activity and cerebral stroke [79]. Aerobic exercise such as cycling and jogging play a major role in reducing blood pressure among people with mild and moderate hypertension [45, 80, 81, 82]. There is a prospective study conducted by the Honolulu Heart Program about the association between physical activity and the risk of stroke among 7, 530 men over 22 years of follow up between the ages of 45 to 68 years. At the time of the study enrolment, an estimate of current 24-hour habitual physical activity was collected from each subject. During the 22 years of follow-up period,

information about cardiovascular events was obtained through a comprehensive surveillance of hospital discharge registers, death certificates, and autopsy records. Based on physical activity, subjects were divided into three groups, the first one contains inactive subjects, the second one partially active, and the third one active subjects. Examination of the risk for stroke is carried out separately among younger middle-aged men between the ages of 45 to 54 years old and older middle aged men between the ages of 55 to 68 years old. Several confounding variables such as age, systolic blood pressure, serum cholesterol, number of cigarettes smoked per day, monthly alcohol intake, serum glucose, serum uric acid, haematocrit, and left ventricular hypertrophy were controlled to know the independent effect of physical activity on stroke. Subjects, who were enrolled in the study with hypertension, diabetes mellitus, or left ventricular hypertrophy, were analyzed separately to know the interactions between these risk factors with stroke. To examine the independent effect of physical activity on stroke, Proportional Hazard Regression Model was used. The results of the study showed that, Inactive or partially active old people were experienced three to four fold excess incidence of hemorrhagic stroke in comparison with active old people ($P<0.01$). Intracerebral hemorrhage occurs two to three fold excess among men who were inactive or partially active in comparison with people who were active. Relative risk for hemorrhagic stroke for inactive men versus active men was 3.7. The relative risk of thrombo-embolic stroke among non-smoker and inactive men was 2.8 in comparison with non-smoker and active men [33].

Another study conducted about the influence of different levels of physical activity on the risk of stroke in members of the Framingham Study Cohort. In this study, 1,897 men (their mean age equal 49.7 years) and 2,299 women (their mean age equal 49.9 years) were involved. A prospective study design, a structured interview to measure daily activity level of subjects, and Cox Proportional Hazards Linear Regression was used to examine the association between physical activity and risk of stroke over a follow-up period up to 32 years. Two separate analyses were done for the subjects, one during midlife and the other during elderly. Stroke was defined as the first occurrence of atherothrombotic brain infarction, cerebral embolism, or other type of stroke. Physical activity was categorized into three levels: low, medium, and high levels and they were compared to a low level of physical activity, which was used as a referent group. The results of the study showed, increased levels of physical activity were protective among men. The strongest effect between physical activity and the risk of stroke obtained among older subjects with medium level of activity. Adjusted analyses showed no significant protective effect in women. These results indicate that medium and high levels of physical activity among men are protective against stroke, relative to low levels [35].

National Health Epidemiological Follow up Survey 1 showed a different result about women in relation to physical activity. They conducted a study to investigate the relationship between physical activity and the incidence of stroke among men and women. In this study, 5,852 white and black persons between the ages of 45 to 74 years old and who met the criteria of the study

were involved. Personal interviews and physical examination provided a baseline data for National Health Epidemiological Follow-up Survey. Persons with unknown baseline history of physical activity, systolic blood pressure, number of cigarettes smoked, body mass index, history of heart disease, educational attainment, cholesterol, history of diabetes, resting pulse rate, and hemoglobin concentration were excluded from the study. Follow-up data collected done three times during 1982 to 1984, 1986, and 1987. Participants were asked about their physical activity and categorized as low, moderate, and high. Longitudinal cohort design was used in this study. The results showed that, there were 249 incident cases of stroke in white women, 270 in white men, and 104 in blacks. There was association between non-recreational activity and increased stroke risk among white women between the age of 65 to 74 years after adjusting the baseline risk factors of age, smoking, history of diabetes, history of heart disease, education, systolic blood pressure, serum total cholesterol, body mass index, and hemoglobin concentration (RR=1.82;95%CI 1.10-3.02). Regular physical activity may be of benefit in preventing stroke in women as well as in men [83].

Not only physical activity and exercising are related to a decrease in the incidence of stroke, but also, they are related to a decrease in risk factors of all cardiovascular disease, such as obesity or body mass index, cholesterol level, and blood pressure [3]. There is a study conducted to assess the prevalence of cardiovascular disease risk factors, which are (obesity or body mass index, cholesterol level, blood pressure and blood glucose level) among a sample of healthy exercising and non-exercising adult women. The

researcher was used cross- sectional design with exercising as independent variables and the other variables which are overweight or body mass index, blood pressure, cholesterol, and blood glucose level as dependent variables. The study was conducted at work sites throughout the United States by using Health Risk Appraisal (HRA), which consists of 62 lifestyle questions, of which 12 were used for analyses to obtain self-reported behavioral data. The sample consisted of 1412 women, who voluntary participated in the study between the age of 30 to 59 years old classified into three categories (30 to 39, 40 to 49, and 50 to 59), who divided into two groups of exercisers and non exercisers. Blood pressure, weight, body mass index, cholesterol, and blood glucose level were examined by using HRA. Moderate intensity of physical activity was used for 30 minutes or more all days of week. The result was exercisers have acceptable body mass index and 12 pounds body lost than non-exercisers at all age groups. There is significantly lower level of low-density lipoprotein cholesterol and triglyceride among the exercisers' group in comparison with non-exercisers in all age categories, except the subjects from 40 to 49 years old. The differences between exercisers and non-exercisers groups were small, but significant in terms of systolic and diastolic blood pressure. Blood glucose did not demonstrate significant differences in exercisers and non-exercisers groups, and feeling of well being and health are higher among exercisers group in comparison with non-exercisers group [84].

5.2.3. Obesity and weight reduction

Obesity is a major public health problem [85, 86, 87, 88] and approximately 27% of woman and 24% of men are 20% or more above desirable weight [85]. Dishman said that The National Institutes of Health Consensus Conference in 1994 reported that obesity is a disease and it is related to an increased risk of both morbidity and mortality from most of the chronic disease such as hypertension, coronary heart disease, and stroke [79]. Obesity is associated with an increased risk of all cause mortality [89], and many specific health consequences, including hypertension [90]. Obesity is not only associated with mild and borderline hypertension, but also is a predictor of future hypertension, and it is considered as an additional risk factor for vascular disease such as stroke and a well known correlated factor to hypertension [45]. He, and Qian et al. conducted a cross-sectional study to investigate the relationship between body mass and blood pressure in three community based by using random sample in south western China. The first community is rural Yi farmers (5,023 men, 3,218 women); the second community is Yi migrants (1,656 men, 919 women); and the third community is Han Chinese living in an urban setting (2,173 men, 1,516 women). Univariate and multivariate regression analyses were used to quantify the relation between body mass index and blood pressure. The result of the study showed both systolic and diastolic blood pressure were positively and statistically significant to body mass index after adjustment of age, smoking, alcohol intake, heart rate, and physical activity [91].

Another study conducted in 1986 about the relationship between stroke Incidence and body mass index and abdominal obesity. A sample of 28,643 United States male health professionals between the ages of 40 to 75 years old was selected. Men with medical history of cerebrovascular and cardiovascular disease or stroke caused by infection or neoplasm were excluded. Cohort and follow up questionnaires were used every two years in 1988, 1990, and 1992. In this study stroke were classified into four classifications, Ischemia (embolism or thrombosis), subarachnoidal hemorrhage, intracerebral hemorrhage, and unknown cause according to National Survey of Stroke. Body mass index and waist/hip ratio were divided into quintiles; relative risks were adjusted by using the Mantel Extension Test. Multiple logistic regression was used to adjust other potential risk factors. The results of this study after five years of follow up showed, there were 118 cases of stroke (80 strokes were ischemic, 25 as hemorrhagic and 13 cases of unknown cause). Men in the highest quintile of body mass index had an age adjusted relative risk of stroke of 1.29 in comparison with men in the lowest quintile of body mass index, and men in the highest quintile of waist/hip ratio had an age adjusted relative risk of stroke of 2.33 in comparison with men in the lowest quintile. In contrast, men in the lowest quintile of body mass index had higher stroke in comparison with the second quintile, which have more body mass index. The results of the study suggested that, abdominal obesity, but not elevated body mass index, predicts risk of stroke in men [32].

In addition, there is another study conducted about the association between changes in weight and physical activity levels and changes in cardiovascular

disease risk factors over approximately a 5 years period among Mexican Americans in the San Antonio Heart Study in 1992 to 1999. The researchers used sample of 539 (321 women, and 212 men) Mexican Americans, who were selected randomly, and they were visited the clinic on two occasions, the first visit was initial screening phase, and the second occasions approximately 5 years later. Subjects who were diabetes, taking anti-hypertensive and anti-lipid medication were excluded from the study. Physical examinations, interviews about life style practice were taken and blood samples were drawn at each clinic visit. Body mass index calculated as weight divided by height squared, both systolic and diastolic blood pressure were measured by using sphygmomanometer, cholesterol and triglyceride concentrations were measured with Ciba-Corning Express plus clinical chemistry analyzer, physical activity was measured by structured interview, and glucose was measured with an Abbott V/P analyzer. The results approximately over 5 years period showed that weight change was correlated with changes in variety of cardiovascular disease risk factors, including lipids and lipoproteins, blood pressure, and insulin, and accounted for 2 to 5 percent of the variance associated with blood pressure change and 2 to 10 percent of the variance associated with change in lipids and lipoprotein. While changing in physical activity was associated modesty only with change in low-density lipoprotein cholesterol [92].

In another trial, Field et al., 1999 conducted a study about the relation between body mass index, weight gain, repeated intentional weight losses, and the risk of self-reported hypertension among 46,224 women between the

age of 33 to 51 years, who were participants, and responded to mail questionnaire about their history of diseases, and health behaviors. The questionnaire was sent to the participants for follow-up three times in 1991, 1993, and in 1995. The researcher divided the subjects into three groups according to the magnitude of the weight loss required by French, and William et al. The first group who lost 9 kg $\geq$ three times between 1989 and 1993 was classified as sever weight cyclers, the second group who lost 4.5 kg $\geq$ three times between 1989 and 1993 was classified as mild weight cyclers, and the third group was classified as non-weight cyclers, who did not met the criteria for both sever and mild weight cycling. A cohort study design and logistic regression as statistical analysis were used. The results of the study showed, over two years of follow-up, 1,107 women were newly diagnosed with hypertension between the period of 1993 and 1995. Body mass index and weight gain, but not weight cycler status, were independently associated with the development of hypertension. For each 4.5 kg gain in weight, the risk of hypertension increased 20 percent between the period of 1989 and 1993. There was a small but not significant relationship between mild and sever cycling and the risk of hypertension, when body mass index and weight gain were adjusted. Women with body mass index of 25 were 12 percent more likely to be diagnosed with hypertension in comparison with women, who had body mass index of 24. This study supported strong independent predictors between weight and weight gain and the development of hypertension [85].

5.2.4. Dietary restrictions of sodium

Sodium chloride has a greater effect on blood pressure than other salts of sodium [93], and it holds a unique position among the environmental factors that are known to affect blood pressure [94]. Not only restriction of sodium effect blood pressure, but also lead to a reduction in the required dose of many anti-hypertensive drugs such as beta blockers, angiotensin converting enzyme inhibitors, and thiazide [95]. Hunt et al., 1996 in changing eating and exercise behavior book said that the department of health 1994 reported a strong and causal relationship between sodium consumption and blood pressure. In addition, a reduction of 50-mmol sodium per day has been estimated to reduce systolic blood pressure of about 3.5 mmHg [96]. Blanchard et al. said that populations with extremely high sodium or salt intake have a high incidence of hypertension compared with low sodium or salt intake populations [80]. Krause et al. said, Dahl suggests that people with family history of hypertension should decrease sodium intake in their diet, and restriction of sodium to 500 mg per day is necessary to achieve good therapeutic results among hypertensive patients [68]. Guesry et al. said that the International Salt (INTERSALT) study showed an association between blood pressure and sodium intake among elderly people, and there is substantial data indicating that sodium intake is related to blood pressure. In the other hand a reduction of sodium intake will reduce both systolic and diastolic blood pressure by a few mmHg [97]. INTERSALT Cooperative Research Group conducted a study by gathering data on blood pressure and 24 hours urinary sodium and potassium excretion for over 10,000 men and women aged 20-59 years in 52 centers throughout the world. The result

showed blood pressure was significantly related of sodium intake, and 10-mmol rise of sodium intake is related to 0.9 mmHg increases in systolic blood pressure [98].

Perry et al., 1978 in mild hypertension treat or not to treat said that Dahl has found the employees of Brook haven National Laboratory, who did not salt their food had approximately 1% incidence of hypertension in comparison with 12.7% with the employees who did salt their food [45]. Cook et al., 1998 in effect of change in sodium excretion on change in blood pressure corrected for measurement error article said that there was a reduction in systolic and diastolic blood pressure with dietary sodium reduction intervention among hypertensive persons. He conducted a study to show the effect of change in sodium excretion on change in blood pressure among 744 subjects, who have high normal diastolic blood pressure (80 to 89 mmHg). These subjects were randomly assigned to an active sodium reduction intervention group or a usual care group, 327 men and women were randomly assigned to active sodium reduction intervention group and 417 to control group. The researcher used longitudinal data from the sodium reduction component of the trials of Hypertension Prevention Phase One, which carried out in 1987 to 1990 with some statistical correction techniques. Blood pressure and urinary excretion measurement were obtained during a series of screening visits and follow up intervals of 6, 12, and 18 months with one 24-hour urine collection at each of these times. Sodium and potassium excretion and the sodium- potassium ratio were estimated for both control and intervention groups by using long tail at higher values statistical test. The results of this study showed that a

decrease of 4.4 mmHg in systolic blood pressure (95%CI 0.1-8.8) and 2.8 mmHg in diastolic blood pressure (95%CI 0.2-5.8) is related to 100 mmol/24 hour reductions in sodium [99].

In 1992 the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure change the term of non pharmacological therapy to lifestyle modification. It advises the hypertensive patients to be compliant with lifestyle modifications such as (reduction of sodium intake, weight reduction, exercise, stop smoking, and low fat diet) for the treatment of hypertension. In addition, it emphasizes that, if blood pressure remains high with lifestyle modifications over three to six months, drug therapy should be started [100].

WHO in diet, nutrition, and prevention of chronic diseases book showed a relationship between types of diet and developing chronic diseases, such as coronary heart disease, gastrointestinal diseases, cerebrovascular disease and diabetes mellitus. Also it emphasize that hypertension is considered the main risk factor of stroke in developing countries with other contributory factors such as increase salt intake, obesity and alcohol intake.

In another trial, a study involving 52 centers in 32 countries around the world conducted by a recent large- scale multinational study about the role of obesity, alcohol and mineral intake in the blood pressure. It founds a strong relationship between obesity and increase in alcohol intake on blood pressure, and a weaker, but significant relationship between increase salt diet and the rise on blood pressure with age [14].

5.2.5. Smoking

Cigarette smoking is the largest heath risk that the people face, and the danger of smoking is greater than any environmental hazards [101]. The Framingham Heart study showed that smoking is a significant and independent risk factor for stroke development in general and brain infarction specifically [102]. Heavy smokers more than 40 cigarette daily were at twice the risk of stroke in comparison with light smokers less than 10 cigarettes daily [17, 103]. Cigarette smoking is the second risk factor of stroke development after hypertension, and black people, who smokes more than 20 cigarettes per day had four times incidence of first attack of stroke than never smokers [104].

Cigarette smoking is by far the largest health risk that most people face. Indeed, the magnitude of the lifetime smoking risk is several times greater than that of many widely regulated consumer and environmental hazards [101]. Cigarette smoking is a risk factor for stroke, and the priorities for stroke prevention are control of blood pressure and reduction of smoking [105].There are three studies supported that. The first one conducted by The Physicians Health Study to examine the association between cigarette smoking and the risk of stroke among United States male physicians, their age between 40 to 84 years of age at entry in 1982, and they were free from previous myocardial infarction, stroke, and transient ischemic attack. A sample of 22071 men was selected and followed for an average of 9.7 years. A prospective cohort study design and mailed questionnaire were used. Mailed questionnaire includes questions about cigarette smoking status, which categorized to never smoked,

formally smoked, currently smoking less than 20 cigarettes per day, currently smoking 20 or more cigarettes per day. Non-fatal strokes were reported on the annual questionnaire, and deaths were reported by families or postal authorities. Non-fatal stroke was defined as a typical neuralgic deficit that was sudden or rapid on onset, lasted more than 24 hours, and was attributable to a cerebrovascular event and strokes were classified according to probable cause, ischemic or hemorrhagic stroke. The results of the study showed, 312 non-fatal and 28 fatal strokes occurred (375 ischemic, 56 hemorrhagic, and 9 unknown causes). Physicians currently smoking 20 or more cigarettes per day had relative risks for both total nonfatal and fatal strokes of 2.52 and 1.24, respectively after adjustment for age and treatment assignment, and in multivariate analysis controlling for other risk factors, these relative risks were 2.71 and 1.46, respectively. Ischemic stroke was more strongly related to current smoking in comparison with hemorrhagic stroke. For total nonfatal stroke and ischemic stroke, we found linear increases in risk a cross the four cigarette smoking categories ($P<0.0001$), and the relative risk among the participants who never smoke was 1.00 [106].

The second study conducted to investigate the association between ischemic stroke risk and passive exposure to cigarette smoking. Sample of 452 subjects, who had first episode of ischemic stroke and admitted to Austin and Repatriation Medical Centre with mean age of 59 years compared with 452 subjects matched with age and sex as a control group. In this study, ischemic stroke was defined as acute onset of a focal neurological deficit lasting more than 24 hours, with computed tomography excluding hemorrhage. Passive smoking was defined as the experience of living with a father, mother, and/or

spouses, who ever smoked at least one cigarette daily for at least a year. A doctor diagnosed hypertension, ischemic heart disease, and diabetes. The results of the study showed that, the risk of stroke was twice as higher among the subjects, whose spouses smoked in comparison with those, whose spouses didn't smoke (95%CI 1.3 to 3.1), after adjustment for the subjects own smoking, heart disease, hypertension, diabetes and education level. The conclusion of this study provides evidence that spousal smoking may be a significant risk factor for ischemic stroke [107].

The third one conducted by He et al. to investigate the relationship of prevalence of hypertension and other risk factors with stroke incidence and mortality. The study was accomplished in twenty-nine provinces among the people Republic of China (PRC). The result showed, highly statistically significant correlation between prevalence of hypertension and stroke incidence (r .838, p <.001), and mortality (r .841, p<.001). Ten percent increase in the prevalence of hypertension was associated with 2.80 fold higher incidence and 2.68-fold higher mortality from stroke. In addition, a ten percent increase in the prevalence of cigarette smoking was associated with 19 percent higher mortality from stroke [108].

Another prospective cohort study among 22,071 men between the ages of 40 to 84 years was conducted in Brigham, and Boston to examine the association between cigarette smoking and stroke in men. The subjects were followed for an average of 9.7 years and classified as never smokers, current smokers, and former smokers. The results of the study showed that there is no association between never smokers and development of stroke (RR=1.00).

An association exist but not significant between former smokers (RR=1.20; 95%CI 0.94-1.53), and development of stroke, but association and significant relationship was present between current smokers (RR=2.02) and increase risk of stroke. The conclusion of this study indicates that current but not former cigarette smoking significantly associated with an increased risk for stroke in men [109].

5.2.6. Follow-up health care

Perry et al. said that a positive correlation has been found between the frequency of outpatient visits and compliance to the therapeutic regimen. He mentioned a study conducted about the importance of follow-up health care and compliance to the therapeutic regimen. This study involved a regular home visit to instruct the patient about the nature of disease, taking the medications, and check blood pressure. After two years of follow-up, the percentage of compliance with the therapeutic regimen rose from 25% to 86%, and the percentage of blood pressure control rose from 15% to 80%. After termination of home visit, and leaving patient on their own, the percentage of compliance to the therapeutic regimen dropped to 55%, and there are only 29% had blood pressure control [45].

In another study conducted about compliance and knowledge of hypertensive patients attending Primary Health Care Centers in Al Khobar, Saudi Arabia. Cross-Sectional study was used with 190 subjects (139 females and 51 males) selected randomly and they have essential hypertension, for at least one year. Trained interviewers using a structured questionnaire interviewed

patients. Compliance was measured by two methods. The first was the therapeutic outcome method where diastolic blood pressure of < 90 mmHg was considered indicative of compliance with treatment and the second was the self-reporting method. The result was a positive family history of hypertension was found in 94 (49.5%) of the patients. Some 58.9% had other chronic diseases, and 78.9% were managed on one anti hypertensive drug, while the rest were using two or more drugs. Cigarette smoking was prevalent in 7.9% of all patients. On the other hand, the self-reporting method revealed that 142 (74.7%) were compliant. The compliance rate was significantly higher among illiterate patients than educated ones and among patients over 55 years of age than those who were younger. There was no significant difference in compliance rates between males and females, nor between Saudis and non- Saudis. Patients who were regular on follow-up (82.1%) had a significantly higher compliance rate than those who were irregular (37.8% and 17.6% respectively; $P<0.02$). The presence or absence of difficulty with compliance, availability of continuity of care, preference for place of care, number of drugs taken for hypertension, mode of diagnosis of hypertension and presence or absence of other chronic disease did not significantly affect the compliance rate. Less than half (41.6%) of patients thought that hypertension could have a permanent cure and 43.7% that medications could be stopped once control was achieved. 40.0% of patients thought that females were more susceptible than males and 56.3% thought that elderly people were more likely to suffer from the disease than younger ones. Almost two-third of the patients (66.3%) thought that the main etiologically factor for hypertension was emotional stress, while only 1.6% acknowledges the role of

heredity in causing the disease. About one-third of the patients (31.6%) did not know the complications of hypertension, while 42.1% knew that it might lead to neurological complications and 1.6% were aware that the disease might lead to renal complications. The opinions of the patients reflect poor management of the disease among the sample studied. The result clearly reveal the importance of regular follow-up in achieving better compliance, emphasizing the need for health education to enforce this habit. The relationship between patient misconceptions about the disease and poor compliance has been documented. In this regard, our results revealed that a considerable proportion of the patients had misconception about the treatment of hypertension, such as believing in a permanent cure for essential hypertension and discontinuation of drugs once control is achieved. Since these misconceptions have a considerable impact on compliance, it is imperative that primary health care physicians correct them through education. Furthermore, many patients believe that emotional stress is an important etiological factor for hypertension and are ignorant of other contributing factors that can be corrected, such as excessive salt intake and obesity. Although the frequency of positive family history of hypertension was high (49%) among the sample, only 2% of patients were aware of the role of heredity in the etiology of the disease. These findings emphasize the important role of primary health care physicians in educating patients about hypertension [110].

5.3. Seasonal pattern and stroke

The existence of a seasonal pattern in the occurrence of stroke remains controversial. Schievink et al. reported in 1995 no evidence and relationship between stroke development and seasonal variation [111], but Alter et al. Showed that the highest stroke incidence rates occurring during autumn [112]. Giroud et al. reported in his article about stroke in a French prospective population-based study that the highest rate of stroke incidence rates occurs during winter [113]. There is a study conducted about the association between stroke incidence and season of the year among 72,779 Veterans, who had stroke at any of the 172 Veteran Affairs Medical Facilities in the United States between the periods of October1, 1986 to September 30, 1995. These subjects have either hemorrhagic or an ischemic stroke, their mean age was 66 years, approximately 70 percent of the subjects was Caucasian, 24 percent was African American, 4 percent was Hispanic, and the other 20 percent from other ethnic group. The stroke was defined by a clinically modified version of the International Classification of Diseases. The researchers used a longitudinal study design and the data was analyzed by using time series methods to determine the nation wide incidence for both ischemic and hemorrhagic strokes separately. The results of the study showed that, there was a clear evidence of seasonal effect in the occurrence of ischemic stroke, while there is no effect in hemorrhagic stroke [114].

5.4. Quality of life

The major consequence of post stroke, which leads to a decrease in quality of life and patient's sense of loss, is body image disturbance and change in patient's role. In addition, the side effect of medications such as antidepressant, anti-cholinergic, and anti-adrenergic agents affect the stroke patients and lead to sexuality dysfunction such as erection and ejaculatory problems [62]. Quality of life is very important and it is considered as the key concept in the contemporary practice of medicine, and delivery of health care [115, 54, 116, 117]. As a health care provider, we are concerned about the quality of life (satisfaction and happiness) among patients with chronic diseases especially hypertension, which are in need to be compliant to some types of therapeutic regimen for along period of time [115]. One of the most important barriers that prevent blood pressure control is the side effect of anti hypertensive medication such as fatigue, dizziness, and sexual dysfunction, which in turn impaired patient's activity of daily living and quality of life [118,119,120]. Sexual dysfunction has a high prevalence among hypertensive men. As sexual function is considered as an important aspect of quality of life among hypertensive patients, it is important to ensure that the anti hypertensive drugs have the lowest effect for causing sexual problems. It is essential to maintain balance between therapeutic efficacy and quality of life to maintain the compliance to the therapeutic regimen [121].

Another study showed, sexual dysfunction among hypertensive men and women is usually not caused by compliance to hypertensive drug therapy, but it is likely due to other factors such as vascular disease [122]. Nearly half of

the hypertensive patients are not compliant; however, if we want to improve therapeutic compliance, we should prevent potential harmful effects of anti hypertensive medication. A meta-analysis of well-selected and comparable trials has shown that anti hypertensive medication as a whole has a positive impact on patient's quality of life [123]. Stein et al. showed that quality of life among hypertensive patients was judged significantly higher in comparison with normotensive persons [124]. Grimm et al. showed in a study with probands suffering from mild hypertension that compliance to anti hypertensive medication do not impaired the quality of life among mild hypertensive patients, but it improves the quality of life by reducing blood pressure [125]. Other study showed that anti hypertensive drug are reduce the quality of life among hypertensive patients [126]. Life style changes especially weight loss, play an important role in decreasing the signs and symptoms of hypertension, which in turn lead to long term benefit and improve patient's quality of life [127]. Grimm et al. showed that not only weight loss is associated with an improvement in quality of life among hypertensive patients, but also a physical activity as well [125]. The main goal of treating hypertensive patients was to maintain or reduce the blood pressure within normal range without looking to the other aspects of patient's lives. Other studies and aims should be taken into consideration to understand the impact and effect of compliance to the therapeutic regimen, mainly anti-hypertensive medication, which may result in lower patient's quality of life [123].

5.5. Summary of the literature review

Hypertension is a major risk factor for ischemic and hemorrhagic stroke, and modern anti-hypertensive treatment is one of the major benefits afforded for stroke prevention. Several epidemiological studies indicate that the frequency of stroke in hypertension is increased considerably as compared with normotensive persons. In addition, correlation was found between blood pressure, both systolic and diastolic, and the incidence of stroke. Other studies has demonstrated that there is no relation between blood pressure, and the incidence of stroke at low pressure levels, but an exponential increase of stroke at high pressure levels. Also several studies conducted in different parts of the world have confirmed that hypertension is the most important modifiable risk factor for stroke. The foregoing literature review highlights the importance of behavioral factors in the management of hypertension. Much less work has been carried out on the interaction between lack of compliance with the therapeutic regimen such as anti-hypertensive medication, dietary restrictions of sodium, weight reduction, exercise program, follow up health care, and smoking and development of stroke. The behavioral factors play a major role in the development of hypertension and stroke. Several epidemiological studies showed that people who are slim, physically active, and eat low salt diet have lower blood pressure and low incidence rate of stroke compared with obese and inactive people.

Clinical trials have provided a firm knowledge base for controlling hypertension to achieve substantial public health benefits. The effectiveness of pharmacologic treatment in reducing systolic and diastolic hypertension is

well established, which shows a major reduction in the risk of cerebrovascular morbidity and mortality, especially for stroke. Dietary salt restriction is very important and it is included in all national and international guidelines for treating hypertension as part of a non-pharmacological strategy. The INTERSALT study provides a positive data on the relationship between salt and blood pressure. In contrast, other studies showed a weakly positive correlation between blood pressure and sodium intake when adjusted for body mass index and alcohol consumption. Also hypertension scarcely exists in populations with extremely high salt intake compared with low salt intake. Exercise is an important non-pharmacological tool in both prevention and treatment of mild to moderate hypertension. Aerobic exercise had been found to be effective in lowering blood pressure among hypertensive individuals. Studies have shown that in sedentary patients with mild to moderate hypertension, regular exercise has resulted in long term lowering of blood pressure. Bicycling, jogging, swimming, and brisk walking are all acceptable forms of exercise, depending on patient tolerance. Long-term physical activity can result in blood pressure reduction, and it appears to have a greater effect on blood pressure in hypertensive than normotensive. In contrast other studies showed that, increased levels of physical activity were protective among men, but not a protective significant among women.

Obesity is a problem that requires serious attention in patients with hypertension. Many studies have demonstrated that weight loss is associated with decrease levels of blood pressure, and the association between obesity and hypertension has been well recognized and documented in many studies,

but controversy has surrounded among the location (such as abdominal obesity, increased waist to hip ratio), and distribution of fat and development of hypertension. Smoking is an independent risk factor for both cerebral hemorrhage and cerebral infarction. The risk of stroke has been found to increase as the number of cigarettes smoked increases. Stop smoking, or at least reducing the number of cigarettes smoked per day, is therefore strongly indicated for the patient with hypertension. The association of smoking and stroke is evident and many studies reported that smoking cessation significantly reduced the excess risk attributed to stroke. Epidemiological studies showed a correlation between frequency of follow-up health care, and compliance with the therapeutic regimen, and patients who were regular on follow-up had a significantly higher compliance rate than those who were irregular. On the other hand, some studies have mentioned the importance of follow-up care in improving the compliance with the therapeutic regimen, and they show how the termination of follow-ups decreases the compliance. The existence of a seasonal pattern in the occurrence of stroke remains controversial. Several investigations conducted in different countries report an association, and identify the highest stroke incidence rates as occurring during autumn, while others find that the highest rates occurring either in winter or in spring, however, other investigations find no evidence. Many epidemiological studies showed that compliance to ant-hypertensive medication impaired patient's activity of daily living, and quality of life. In contrast, other studies showed that anti-hypertensive medication as a whole has a positive impact on patients' quality of life, and sexual dysfunction, and impaired quality of life is

usually not caused by compliance to anti-hypertensive drug therapy, but it is likely due to other factors such as vascular disease.

Chapter 6

Research problems, aims and objectives

In light of the background and introduction to the present research (chap.1, 2, 3, 4 and 5), this chapter formulates the research study problems, aims, objectives, and hypotheses.

6.1 Statement of purpose

The main purpose of this study is to examine the association between non-compliance with the therapeutic regimen and development of stroke among hypertensive patients in Gaza Strip.

6.2. Study Hypotheses

The operation research can be broken down into four hypotheses

6.2.1. Null hypothesis (statistical hypothesis)

There is no relationship between non-compliance with the therapeutic regimen and development of stroke among hypertensive patients in Gaza Strip.

6.2.2. Alternative hypothesis

Hypertensive patients who developed stroke are less likely to be compliant with the therapeutic regimen than the hypertensive patients who did not develop stroke.

6.2.3. Null hypothesis (statistical hypothesis)

There is no relationship between non-compliance with the therapeutic regimen and quality of life among hypertensive patients.

6.2.4. Alternative hypothesis

Hypertensive patients who are more compliant with the therapeutic regimen show greater increase in quality of life than those who are less compliant

6.3. Research questions

1. Does non-compliance with the therapeutic regimen affect the development of stroke among hypertensive patients?
2. What are the risk factors associated with the development of stroke among hypertensive patients?
3. What are the differences in quality of life among hypertensive patients in terms of compliance and non-compliance with the therapeutic regimen?
4. Does seasonal pattern affect the occurrence of stroke?

6.4 Aims and objectives

The study described in this thesis aims: first, to understand the relationship between non-compliance with the therapeutic regimen and development of stroke among hypertensive patients in Gaza Strip; second, to provide reliable information that help in improving the quality of life among hypertensive patients.

The study was undertaken to achieve the following four objectives:

1. To ascertain whether an association exists between non-compliance with the therapeutic regimen / life style (anti-hypertensive medication, dietary restrictions of sodium, weight reduction, exercise program, follow-up health care, and smoking), and development of stroke among hypertensive patients.

2. To determine the risk factors which contribute to the development of stroke.

3. To evaluate the differences in quality of life among patients with stroke and history of hypertension (case group), and hypertensive patients without stroke (control group) one year before the study.

4. To assess the existence of seasonal pattern with the occurrence of stroke.

6.5. Definition of the terms

In the present study, the definitions of the following terms were applied:

Compliance "The extent to which patients follows medical advice" [52].

Stroke A registered hypertensive patient without history of other diseases, who has a sudden loss of brain function and treated by therapeutic regimen for more than one year before stroke onset, and the diagnosis of stroke confirmed by physician and computed tomography scan.

Hypertension A registered hypertensive patient without history of other diseases, who has an elevated blood pressure confirmed by physician and treated by therapeutic regimen for more than one year.

Quality of life **"**A sense of personal satisfaction with the areas of life that is more than just pleasure or happiness" [53]. According to Lerner, and Grant (1994 and 1998) these areas are categorized into many dimensions: physical function, sexual, cognitive, sensory, energy, mental health, social activity, spiritual, and role function [54, 55].

Therapeutic regimen "A plan that deals with different methods of treatment and healing, particularly the use of drugs, diet restrictions, weight loss or reduction, exercise program, and follow-up health care in the cure of disease" [56].

Chapter 7

Methodology of the study

This chapter presents the study design, period of the study, ethical considerations, setting, study population, sample and sampling method, exclusion criteria, instruments, anthropometric measurement scale, constraints and limitations of the study, and analysis. A greater understanding of the study methodology in stroke research may help or develop a critically balanced review of the substantive content of the growing body of stroke literature. Two major components were emphasized during this study: (1) the information from population-based stroke data was summarized and interpreted in a meaningful way; and (2) the case control study was used to understand compliance with the therapeutic regimen, risk factors, seasonal pattern, and development of stroke.

7.1. Study design

For the purpose of the present research, a paired matched case-control study design was used in which some present phenomena were linked with other phenomena that occurred in the past [170]. This design is a common and an important method to study etiology and clinical questions. It is sometimes referred to as a retrospective study because data on the factor of interest are collected retrospectively, and used to investigate factors that may prevent or cause disease. The method involves two groups, the cases (patients), and the controls (comparison), which did not have the disease. Patients with stroke and history of hypertension were selected for comparison with hypertensive patients without stroke. The comparison was aimed to assess factors that may

differ in both the case and control groups, and to clarify the risk factors associated with each factor individually, and in combination.

7.2. Period of the study

The study started in 1 January and ended 31st of December in 2001, including administrative preparations such as permission from the Ministry of Health, and ethical approval (appendix No.2).

7.3. Setting

This study conducted at the three main governmental hospitals in Gaza Strip, which are AL-Shefa, Khan-Younis (Nasser), and European hospitals, and the primary health care centers where the subjects with stroke and history of hypertension used to make a follow-up health care before developing stroke. These primary health care clinics are (Shohda Jabalia, Shohda Beit Lahia, Shohda El-Rimal, Sorane, Deir-El-balah, El-Magazie, Shohda khan-younis, and Shohda Rafah health centers). Interviewing subjects took place in the hospitals, primary health care centers (clinic), and at home. The provinces of Gaza Strip are (North, Gaza, Mid Zone, Khan-Younis, and Rafah). According to 1997 census, the population in Gaza Strip is estimated to be 1,000,175 inhabitants. More than 16% of the population resides in the north of Gaza, 52% in the central area and the people in both areas are mainly treated at Shefa hospital. Thirty-two percent of the population resides in the southern area and they are mainly treated at Khan-Younis (Nasser) and European hospitals [10].

7.4. Study population

The study population is the entire aggregation of cases that meet designated set of criteria, in this study; the population consists of two groups: mainly a sample of case group who had stroke and history of hypertension, and another sample of control group who had hypertension without stroke. The mean age was 55 years (standard deviation 6.6). The sample was restricted to those aged 40-69 years to focus on the groups at greatest risk for stroke. Fifty-eight percent of the participants were from Shefa Hospital, sixteen percent from Nasser Hospital, and twenty six percent from European Hospital. There were no differences between male and female participants in the case group in comparison with the control group regarding age, sex, period of duration of the therapeutic regimen, and enrollment location.

7.5. Sample and sampling method

Three different teams collected the data simultaneously over a three months period. Prior to data collection process, the instruments were piloted to examine the research tools in terms of acceptability, applicability, and the time frame. All available discharge data of patients from the Disease Registry Office, and the three main hospitals in Gaza Strip (Shefa, Nasser (Khan-Younis), and European Hospital) were screened for cases. Patients who had been hospitalized for acute stroke and history of hypertension between 1st January and 31st December 2001 were defined as cases.

A non-probability purposive sampling methods was used to select subjects for the study. Matching, homogeneity, and blocking were used to control extraneous variables. The sample size was determined by the number of patients fulfilling the inclusion criteria for cases during the sampling period in 2001. According to the paired 1:2 matching procedures, a certain number of controls were recruited. The case group included 112 subjects (58 men and 54 women) with stroke and history of hypertension only. The control group consisted of 224 subjects (116 men and 108 women) matched with age, sex, period of duration with the therapeutic regimen, enrolment location, and with single history of hypertension (no other physical disease). The control group was selected from the same places, where the cases subjects used to make a follow-up in the primary health care centers before the development of stroke. These primary health centers are (Shohda Jabalia, Shohda Beit Lahia, Shohda El-Rimal, Sorane, Deir-El-balah, El-Magazie, Shohda khan-younis, and Shohda Rafah health centers). This type of control selection is called non-hospitalized community, geographic area, community controls or population controls from which the cases arose [128, 129]. Subjects in both groups, who were over 69 years old, deaths, with history of other diseases for an elevated risk for the development of stroke (e.g. diabetes, myocardial infarction, atrial fibrillation, pulmonary edema, asthma), with the duration of their therapeutic regimen less than one year, with second attack of stroke, and without computed tomography scan were excluded from the study.

7.6. Exclusion criteria

The total number of cases was 180 subjects with stroke and history of hypertension (107 from Shefa, 34 from Khan-Younis (Nasser), and 39 from European hospital) during the sampling period 1st January and 31st December 2001. Sixty-eight patients were excluded from the study, seven subjects over 69 years old, 19 death, 7 did not have computed tomography scan of the head, 4 refused to participate in the study, 18 had a second attack of stroke, 3 subjects started their therapeutic regimen less than one year, and 10 subjects participated in the pilot study. The main reason for exclusion of the subjects, who participated in the pilot study, was to prevent both interviewer and respondent bias due to asking, and repeating the same questionnaire. In addition, we asked the subjects about their reactions and impressions regarding the questionnaire. The exclusion criteria for the cases applied to the controls as well subsequently to the matching process. According to Palestinian Central Bureau of Statistics (PCBS) the average life expectancy of the Palestinian population is 71.82 in the year of 2000, because of that I choose the age span between the ages of 40-69 years [130], In addition, these subjects between this age group are at risk for development of stroke.

7.7. Data collection

Face to face structured interviews were used by trained interviewers to collect data from both family and patients especially in stroke patients (case group), who were unable to communicate verbally with the interviewers. The interview was done in three settings, which are hospitals, primary health centers, and at home. Arrangements of data collection started on 1st of January until 31st of

December 2001. The trained interviewers explained to the subjects in both groups about the important, aim, and purposes of the research study. We are living in a conservative society with some private ethics, moral, and rules, so a qualified female who had knowledge and experience assisted the researcher during data collection especially with the female subjects.

7.8. Questionnaire

Using a questionnaire is by far the quickest, cheapest, and relatively confidential method of collecting large amounts of information in social and health research. In addition, it is efficient in the measurement of concepts and construct as quality of life. A structured interview (closed ended questions) was used in this study to provide opportunity to the respondents to seek clarification by helping them, where necessary, and to understand the question well. Also all the questions are ideally asked in the same way during the data collection to achieve a high degree of validity and reliability. The instrument in this operational research included four parts. We developed the first part ourselves, which deals with personal data, medical, socio-economic status, and knowledge and misconception of disease. The second part, which deals with compliance to the therapeutic regimen, has been taken from Medical-Surgical Nursing Textbook with modifications [3]. The third one, which deals with psychological and environmental stressors, has been taken partly from SCL-90-R (Psychosomatic questionnaire) [131], and the fourth part (quality of life) of the questionnaire was adopted from the World Health Organization (WHO) short version with some modifications [132].

Certified translations of the questionnaires from German into Arabic language, and from English into Arabic language were carried out, and the translation was performed twice independently and the results were checked for inconsistencies.

Testing the instrument a small-scale feasibility study (pilot study) was done by using a small sample consisting of 10 cases of stroke with history of hypertension (5 males and 5 females), and 20 patients as a control group. This gave us a fair idea about the length of the questionnaire, and whether all the respondents understand the questions in the same way. In addition, the pilot study was important for directing and guiding the qualified interviewers to adjust, and improve performance in data collection. The questionnaire included issues about personnel information (age, sex, address, marital status, number of children, weight, and height). In addition, it included medical information, socio-economic information, compliance with the therapeutic regimen (Anti-hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, follow-up health care, and smoking), knowledge and misconception of disease and quality of life questionnaire, which included issues about satisfaction, happiness, and several aspect of daily life.

Some changes were done after the collection and the pre-test results regarding the length of the instrument. To enhance the validity of the instrument, tests for face and content validity were carried out, and the questionnaire was submitted to experts and knowledgeable persons to make

suggestions for the adequacy and relevance of the questions. The main reasons for validity tests are to ensure the instrument answers the research questions, and adequately represent the different aspects of the issues being studied. To enhance the reliability of the instrument, "test-re-test" was done and the questionnaire administered to a small sample consisting of 10 cases of stroke with history of hypertension (5 males and 5 females), and 20 patients as a control group. After three weeks, the same questionnaire was re-administered to the same group and the result showed similar answers and responses. The main reason for reliability test is to ensure the questions clear and unambiguous, and all respondents interpret the instructions given by the same way.

Rational for using World Health Organization Quality Of Life (WHOQOL) questionnaire

1. Designed to be a universal instrument to measure the quality of life and used throughout the world in order to facilitate the translation and adaptation procedures [133, 54, 134].

2. It included health as a major component and it had many dimensions such as physical function (activity of daily living), sexual, cognitive, sensory, energy, mental health, social activity, spiritual and role function [54, 55].

7.9. Anthropometric assessment

Height (in meters) and current weight (in kilograms) have been taken from patients files and self reported during the interviews. Body mass index (BMI) was calculated as weight divided by height squared (weight (kg)/height (m^2) [135, 136, 171, 172, 173, 174]. The validity of the anthropometric measurements was assessed during the small-scale feasibility study (pilot test). Table 2 shows the classification of the degree of obesity (BMI) by Garrow ,1981, and Webster, 1985.

Table (2): Body Mass Index

Degree of obesity	Value index	Comprehensive
Zero (0)	20.0 -24.9	Acceptable
1	25 –29.9	Overweight
11	30 –40	Obesity
111	Over 40	Sever obesity

(Garrow, 1981, and Webster, 1985)

7.10. Constraints and limitations of the study

We faced many difficulties during the collection of data, but the main constraints of this study was due to political situation such as the border are mostly closed between the area of Gaza Strip, and it was difficult to pass from one area to another to do the interviews with the patients. In addition, lack of arrangement of discharge papers, and limited resources are other constraints. Some of the patients were living near the settlements, and it was dangerous for the interviewers to be near these places. Some of the family and patients were not cooperative, due to political situation. There is a little information about the morbidity rate among the governmental hospital in Gaza strip, and

there were some cultural constraints regarding the permission to enter the house. Other limitations were some of the patients refused to participate in the study, did not have computed tomography scan due to economical or technical problems.

7.11. Ethical considerations

Patients were asked to give informed consent, which permitted the researchers to review the previous patient's records. Before the interview, the researcher emphasized the confidentiality of the study, and all subjects in both groups had an opportunity to accept or refuse to participate in the study.

7.12. Data analysis

Data and calculations were assessed using SPSS statistical system [137], and SAS procedure PHREG [138]. Descriptive statistic and frequency distributions were generated to make a comparison between case group with stroke and history of hypertension and control group with history of hypertension regarding compliance with the therapeutic regimen, and seasonal pattern and development of stroke. A conditional logistic regression analysis was used to determine the risk factors, which contribute to the development of stroke (Medication not taken as prescribed, using excessive salt at meals, eating diet high in fat, involvement in a regular program of exercise, smoking, and high level of stress) as independent variables and development of stroke as dependent variable. This model is an important analytical techniques, which used to determine how likely the observed response is with respect to all possible responses [175, 176]. Also to obtain

conditional logistic regression estimates for 1:m and n:m matched studies using SAS, the PROC PHREG procedure should be used. The most essential step in using PROC PHREG is the variables representing cases and controls must be redefined or a new variable is created [177]. In addition, the same model was used to determine the interaction between high-level of stress and using excessive salt in meals, and smoking and development of stroke. Analysis of variance (ANOVA) was used to evaluate the differences in quality of life among case, and control groups. It used to test the significance of differences between means. The statistics computed in an ANOVA-procedure is the F-ratio test, because the statistics is based on more than two groups [178, 179].

Chapter 8

Results of the study

This chapter is the core of the study presenting the results of the work carried out in Gaza Strip. Our study population composed of 112 individuals (case group), and 224 subjects as a (control group). The mean age was 55 years (standard deviation 6.6). Approximately 58 percent of the participants in the case group were treated at Shefa hospital, 16 percent at Nasser hospital, and 26 percent at European hospital. The sources of results were by administered a structured questionnaire (closed ended questions). Interviewing was done to the patients and/or family, speaking with the team caring for the patient, and reviewing the medical record in the department in which the patient was hospitalized. Systematic reviews of documents in the medical record departments, primary health centers and emergency wards of the hospitals were made concomitantly to detect any missed cases. This chapter composed of three parts. The first part provides descriptive statistic and frequency distributions about the socio-demographic characteristic among the case and control group. The second part focuses on the factors of compliance and non-compliance with the therapeutic regimen, and the relationship between seasonal pattern and development of stroke. The third part introduces the percentages of quality of life among the case and control group.

8.1 Socio-demographic characteristics among the case and control groups

Socio-demographic and medical characteristic in this study composed of several parts, such as age, gender, income diagnosis, weight, height, treatment facilities, health care facilities, hospital, health centers, health care

programs, factors of compliance/non-compliance with the therapeutic regimen and quality of life. Because hypertension is the most important risk factor in the development of stroke [18], it is important to understand the relationship between these socio-demographic variables, and health outcomes, including quality of life in this disease.

8.1.1 Distribution of the study population by the name of hospital

Table 3 shows the distribution of the study population among the case group in the three main governmental hospitals in Gaza strip**.** The study population shows 58% of the participants were from Shefa hospital (the biggest hospital in Gaza Strip), 16% from Nasser hospital, and 26% from European hospital. Approximately 68 % of the population in Gaza Strip is treated at Shefa hospital compared with 32 % treated at Nasser hospital and European hospitals. Mainly people living in (Gaza North, Gaza City, and Mid Zone area) are treated at Shefa hospital, and people who are living in Khan-Younis and Rafah city are treated at Nasser and European hospitals.

Table (3): Distribution of the study population by the name of hospital among case group

The name of the hospital	Frequency (N)	Valid percent (%)	Total
Shefa hospital	65	58.0	65 (58%)
Khan-Younis (Nasser) hospital	18	16.1	18 (16.1%)
European hospital	29	25.9	29 (25.9)
Total	112	100	112 (100%)

8.1.2 Distribution of the study population by location of health centers among control group

As shown in table 4 the control group was selected from the same places, where the case subjects used to make a follow-up in the primary health centers before the development of stroke. These primary health centers are Shohada Jabalia, Shohda Beit Lahia, Shohda El-Rimal, Sorane, Deir-El-balah, El-Magazie (located in Gaza North, Gaza City, and Mid Zone area), Shohda Khan-Younis, and Shohda Rafah health centers (located in Khan-Younis, and Rafah city). This type of selection is called non-hospitalized community, geographic area, community controls or population controls from which the cases arose [128].

Table (4): Distribution of the study population by the location of health centers among control group

Location of the health centers	Frequency (N)	Valid Percent (%)	Total
Gaza North, Gaza City, and Mid- Zone Health centers	130	58.0	130 (58%)
Khan-Younis health center	36	16.1	36 (16.1%)
Rafah health center	58	25.9	58 (25.9%)
Total	224	100	112 (100%)

8.1.3 Frequency of the diagnosis among the case and control groups

Table 5 includes the frequency and percentage of the diagnosis in the case and control groups. The diagnoses are summarized in two groups:

Hypertension and stroke 112 subjects (case group), and hypertension 224 subjects (control group).

Table (5): Distribution of the study population by diagnosis among the case and control groups

Diagnosis	Frequency (N)	Percentage (%)
Hypertension and stroke (case group)	112	33.3
Hypertension (control group)	224	66.7
Total	336	100.0

8.1.4 Distribution of the study population by age

The study population shows 57% of the subjects among the case and control groups were between the ages of 52-63 years, 24% between the ages of 64-69 years, 16% between the ages of 46-51 years, and 3% between the ages of 40-45 years. Approximately two third of the patients among the case and control groups were between the ages of 52-63 years.

Table (6): Age distribution of the study Population among the case and control groups

	Case group		Control group		
Age in years	**Frequency (N)**	**Valid percent (%)**	**Frequency (N)**	**Valid percent (%)**	**Total**
40-45	3	2.7	6	2.7	9 (2.7%)
46-51	18	16.1	36	16.1	54 (16.1%)
52-57	32	28.6	64	28.6	96 (28.6%)
58-63	32	28.6	64	28.6	96 (28.6%)
64-69	27	24.1	54	24.1	81 (24.1%)
Total	112	100.0	224	100.0	336 (100%)

8.1.5 Distribution of the study population by gender

The study population shows 52% of the patients among the case and control groups were male compared to 48% who were female.

Table (7): Distribution of the study population by gender among the case and control groups

	Case group		Control group		
Gender	**Frequency (N)**	**Valid percent (%)**	**Frequency (N)**	**Valid Percent (%)**	**Total**
Male	58	51.8	116	51.8	174 (51.8%)
Female	54	48.2	108	48.2	162 (48.2%)
Total	112	100.0	224	100.0	336 (100%)

8.1.6 Distribution of the study population by body mass index (BMI)

Body mass index was calculated as weight divided by height squared (weight (kg)/height (m^2), and the degree of obesity classified according to Garrow, 1981 [135,136]. Among the case group 3.6% had acceptable weight, 23.2% over weight, 66.1% obese, and 7.1% had over obesity. In comparison to the cases in the control group 8.5% had acceptable weight, 32.1% over weight, 55.8% obese, and 3.6% had over obesity.

Table (8): Distribution of the study population by (BMI) among the case and control groups

	Case group		Control group		
Body Mass Index (BMI)	**Frequency (N)**	**Valid percent (%)**	**Frequency (N)**	**Valid Percent (%)**	**Total**
20-24.9 (Acceptable weight)	4	3.6	19	8.5	23 (6.8%)
25-29.9 (Over weight)	26	23.2	72	32.1	98 (29.2%)
30-40 (Obesity)	74	66.1	125	55.8	199 (59.2%)
Over 40 (Over obesity)	8	7.1	8	3.6	16 (4.8%)
Total	112	100	224	100	336 (100%)

8.1.7 Distribution of the study population by Income

The result shows 43% of the case group had an average income less than 200 $ per month, 26% had 200-350 $, 26% had 360-550 $, and only 5% had 560-750 $. In comparison to the cases in the control group 45% had an average income less than 200 $ per month, 34% had 200-350 $, 17.4% had 360-550 $, and only 4% had 560-750 $. Approximately more than one third of the subjects among the case and control groups had an average income less than 200 $ per month.

Table (9): Distribution of the study population by an average income per month in US.$ among the case and control groups

	Case group		Control group		
Average income	**Frequency (N)**	**Percent (%)**	**Frequency (N)**	**Percentage (%)**	**Total**
Less than 200$	48	42.9	101	45.1	149 (44.3%)
200-350 $	29	25.9	76	33.9	105 (31.3%)
360-550 $	29	25.9	39	17.4	68 (20.2%)
560-750 $	6	5.4	8	3.6	14 (4.2%)
Total	112	100,0	224	100.0	336 (100%)

8.2 Factors of compliance and non-compliance with the therapeutic regimen

The treatment of hypertension needs as with other preventive therapeutic regimen a reliance on the patient for the day-to-day management of therapy. Unfortunately, poor patient compliance is well documented by recent research, and a health care provider who previously viewed patient compliance is out of their responsibility and experts are devoting more attention to compliance problems. Failure to follow drug regimen as prescribed has been implicated in approximately 50% of patients with resistant hypertension [139]. Non-adherence to therapy can be attributed to several factors such as cost of medication, inadequate patient education, literacy, and adverse side effects of the medication [140]. The National Health and Nutrition Examination Survey finding shows that 53% of patients with hypertension are treated with the medication as prescribed, and only 27 percent have their hypertension under control [141].

Good communication between the physician and the hypertensive patient lies at the core of the successful compliance with the therapeutic regimen. Since the treatment of hypertension and prevent its complication such as stroke is for life, it is essential that the physician establish a good relationship with the patient, provide the patient with information, and answer any question the patient may have. Good information about hypertension, complications as stroke, risk factors, prognosis, benefits and side effect of treatment will be essential for satisfactory life long compliance with the therapeutic regimen. Failure to establish effective communications and relation will generally lead

to poor compliance with the therapeutic regimen, and unsatisfactory control of the raised blood pressure [142].

Table 10 includes the frequencies of the factors of compliance and non-compliance in the case and control group. The factors are summarized into 6 groups: anti-hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, follow-up health care, and smoking. The patients in the case group showed a high percentage rate of compliance to anti-hypertensive medication [taking the medication as prescribed (75.0%), and at proper time (69.6%)], keeping follow-up clinic (62.5%), regular measurement of blood pressure (54.5%), and not smoking (64.3%). This high percentage rate of compliance to these factors in comparison to other therapeutic regimen among case group could be culturally reasoned, because the Palestinian community used to be lived in extended family, and every member of the family tried to give the medication as prescribed and at proper time or even an advice regarding the importance of follow-up, and stop smoking to his mother or father.

In contrast to that the patients in case and control groups have shown low percentage rate of compliance to weight reduction [case (3.6%), and control (15.6%)], and exercise program [case (16.1%) and control (48.7%)]. This low percentage rate of compliance to weight reduction and exercise program in comparison to other therapeutic regimen could be due to unstable political and economical situation in Gaza Strip. As shown in table 10 the patients in control group with history of hypertension were more compliant with the

therapeutic regimen (anti hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, follow-up health care, and smoking with the comparison of case group with stroke and history of hypertension).

Table 10

Table (10): Frequency and percentages of the factors of compliance and non- compliance with the therapeutic regimen among the case and control groups

	Case group (N=112)		Control group (N=224)	
Therapeutic regimen (Life style)	Yes (Compliance)	**No (Non-compliance)**	Yes (Compliance)	**No** (Non-compliance)
Anti-hypertensive medication				
Taking the medication as prescribed	75.0% (N = 84)	25.0% (N= 28)	95.5% (N=214)	4.5% (N= 10)
Taking the medication at Proper time	69.6% (N = 78)	30.4% (N=34)	93.3% (N = 209)	6.7% (N = 15)
No running out of pills even for a single day	38.4% (N= 43)	61.6% (N = 69)	60.7% (N = 136)	39.3% (N= 88)
Dietary restrictions of sodium And fat				
Not using excessive salt in Cooking or at meals	41.1% (N = 46)	58.9% (N = 66)	81.3% (N = 182)	18.8% (N = 42)
Family preparing a special low Low salt diet	33% (N = 37)	67% (N = 75)	51.8% (N= 116)	48.2% (N= 108)
Not eating diet high in fat	37.5% (N= 42)	62.5% (N= 70)	73.7% (N= 165)	26.3% (N = 59)
Weight reduction				
Involvement in regular program of weight reduction	3.6% (N = 4)	96.4% (N = 108)	15.6% (N= 35)	84.4% (N= 189)
Exercise program				
Involvement in regular program of exercise	16.1% (N = 18)	83.9% (N = 94)	48.7% (N = 109)	51.3% (N = 115)
Follow-up health care				
Regular measurement of blood pressure	54.5% (N = 61)	45.5% (N = 51)	79% (N = 177)	21% (N= 47)
Keeping follow-up clinic or Physician appointment	62.5% (N = 70)	37.5% (N = 42)	83.5% (N = 187)	16.5% (N = 37)
Smoking				
Not smoking	64.3% (N = 72)	35.7% (N = 40)	78.6%(N = 176)	21.4% (N = 48)

8.2.1 Taking the medication as prescribed among the case and control groups

This diagram shows that both case and control groups are mainly complaint as most families in Gaza Strip are extended, so patients will have family members reminding them of taking the medication. On the other hand, we see some variation, which could be due to political reason. As we know people in Gaza Strip are living under sewage and very bad human circumstances. Patients may not able to attain their medication at time.

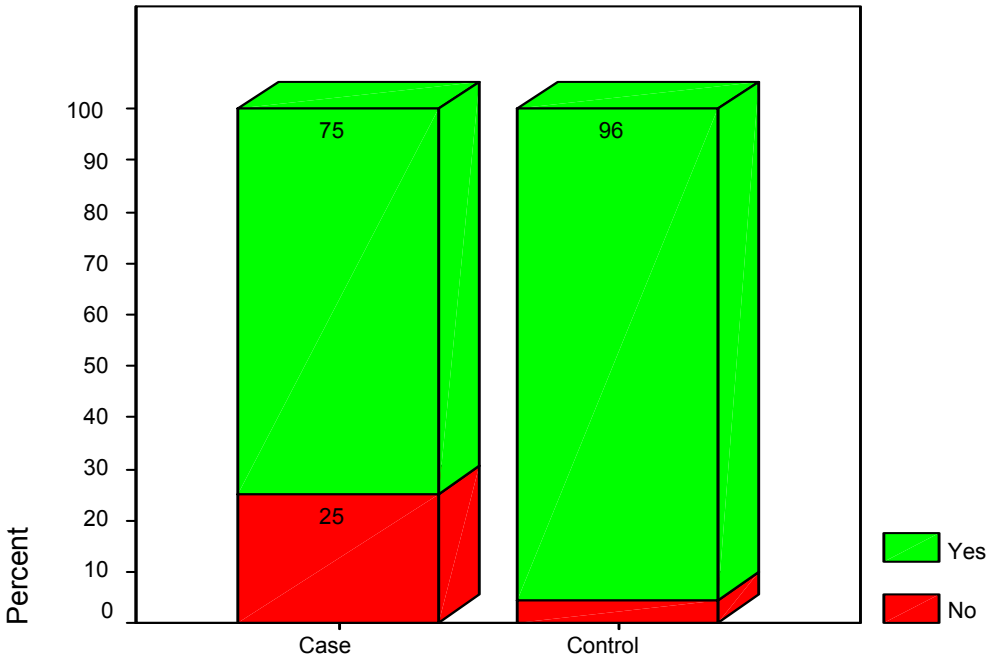


Figure No. (3)

8.2.2 Taking the medication at proper time among the case and control groups

Approximately most of the patients in both groups were highly complaint to taking the medication at proper time. In Gaza Strip, about 98% of the populations are Moslems. Moslems pray five times a day at Dawn, Midday, Afternoon, Evening, and night prayer. As professional, we know the time of taking medication matches in away the time of some prayers. For example if the patient is taking the medication twice a day (BID), the doctor will instruct the patient to take the medication after dawn and the evening prayer. This will make it very easy for them to comply with the regimen, because some of the patients have problems to recognize the official time.

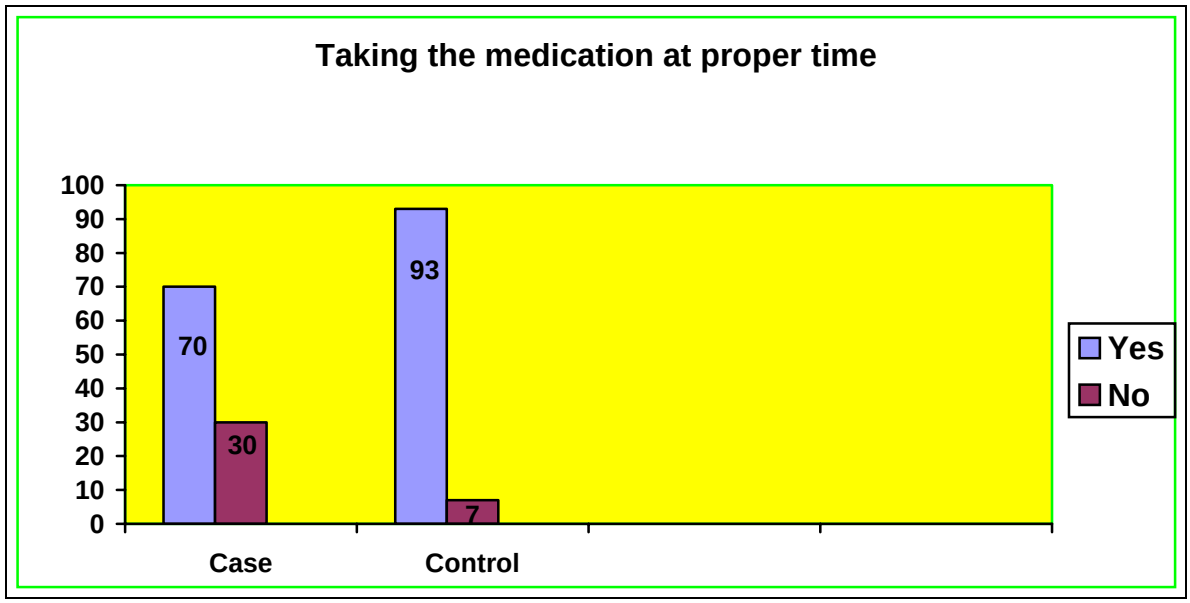


Figure No. (4)

8.2.3 No running out of pills even for a single day of the case and control groups

Normally the chronic patient takes the medication from the governmental clinic monthly. The medication in the clinics will be available for few days, and then it will finish. Some patients take the whole amount of medication for the month; other patients may not be able to reach the clinic at proper time to take the whole amount of medication due to incursion and closure in their area. These people may take two third of the amount which is not enough for the whole month. On the other hand sixty one percent among the control group is living in the same situation of the case group, but some of them are able to buy the missing amount of medication and some of them are not under curfew and can reach their clinic at time.

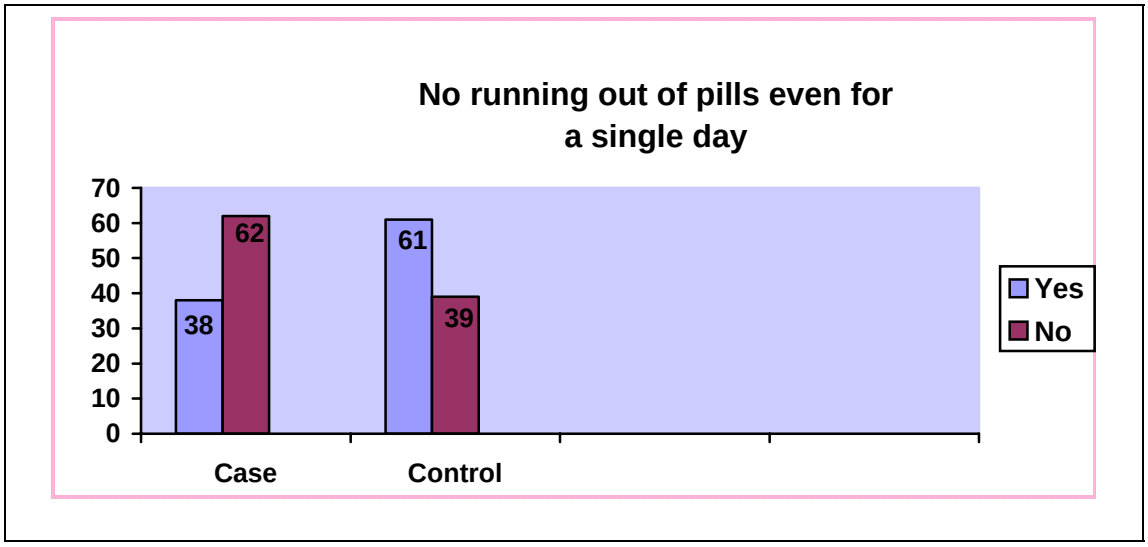


Figure No. (5)

8.2.4 Not using excessive salt in cooking or at meals among the case and control groups

Fourty one percent of the case group was compliant to not using excessive salt in cooking or at meals and 59% showed non-compliant. In comparison to the cases in the control group 81% was compliant and 19% non-compliant to not using excessive salt in cooking or at meals. People of Gaza are known of eating salty and spicy food even in comparison to people of west bank. The low percentage of compliance rate among the case group is back to the way the people used to cook, as low salt diet is not preferable, and ignorance and carelessness as well. In the opposite side, we see the high compliance rate among the control group, as these people may be more educated and aware of the undesired outcomes of salty food.

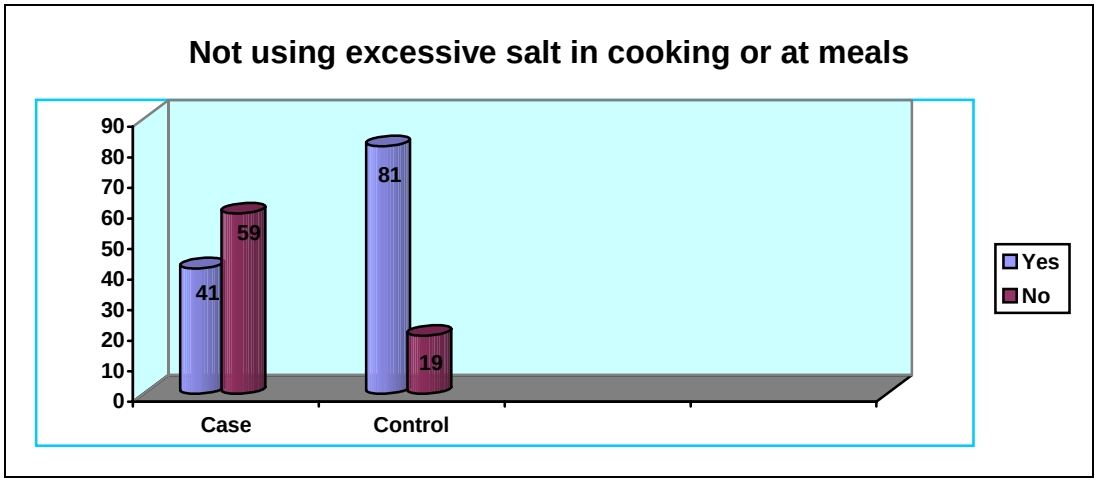
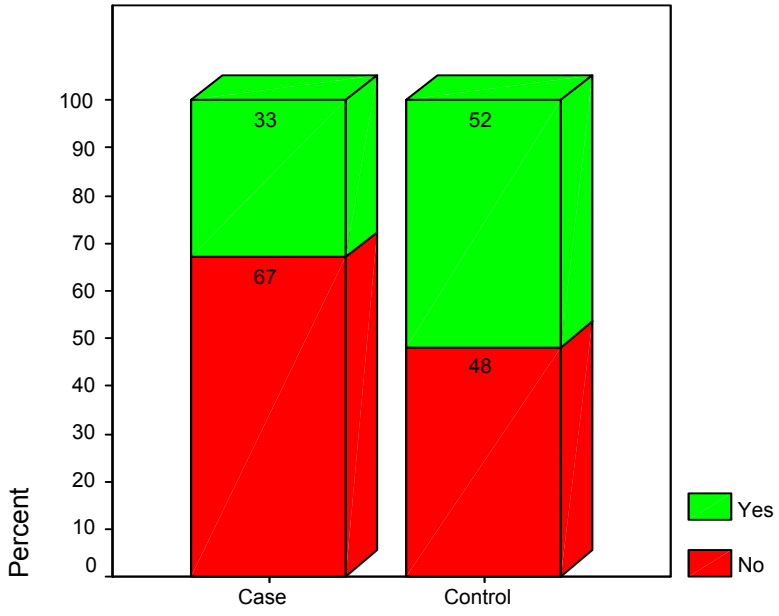


Figure No. (6)

8.2.5 Family preparing a special low salt diet among the case and control groups

Families in Gaza Strip are extended and mostly over eight members in each family. Our families used to eat together from the same types of food. As we see, this is implemented obviously in figure No. (7), as almost two third of the case group was non-complaint. Patients feel like abundant if they eat alone. Emotionally they prefer to eat regular food with their family rather than eating a special diet. Even in control group, almost half of it is non-complaint due to the same reason. Another reason of non-compliance is lack of education among family members, and patients.



Family preparing a special low salt diet

Figure No. (7)

8.2.6 Not eating diet high in fat among the case and control groups

Although we have a high percentage of health education personnel in Gaza, but these health practionners are not enough to educate the patients of the danger of the high fat diet. Lack of health education and misconception of knowledge among patients are playing a major role in non-compliance. Patients may know that salty foods are not healthy for them, but they are unaware of the dangers of fatty foods as it could lead to atherosclerosis, which is the main predisposing factor of hypertension. Culturally it is unacceptable to refuse any food served to you if you were invited to meal. Some patients will feel embarrassed to refuse the foods served to them in any occasion even if it is harmful to them in order to satisfy their friends and relatives.

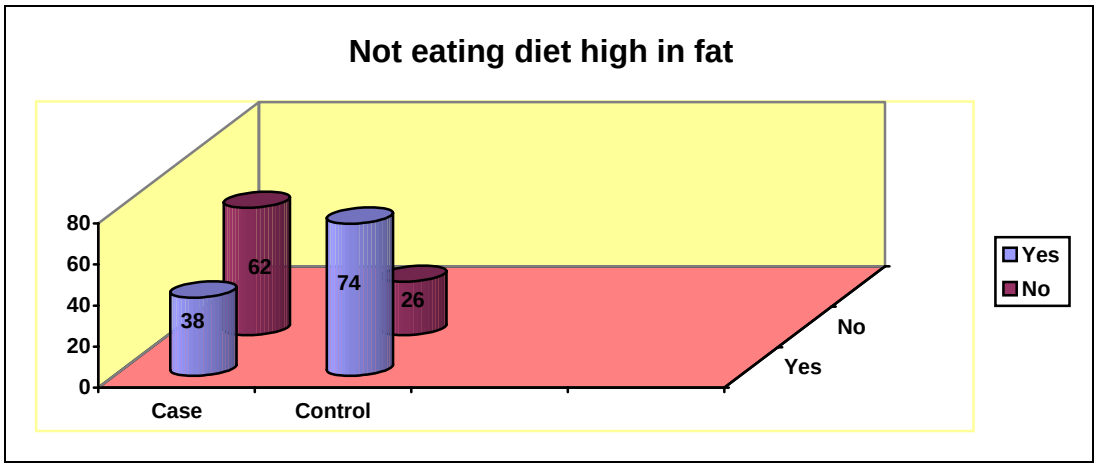


Figure No. (8)

8.2.7 Involvement in a regular program of weight reduction among the case and control groups

As shown in figure No. (9), we can see that both groups are almost non-compliant to regular program of weight reduction. This issue suits our society and environment. Weight reduction is not a part of our culture. You can only see a very low percentage of people involved in a regular program of weight reduction in Gaza. This is mainly applicable for young girls and women as over weight women are not favored in our society. This group of young girls and women participate in a special program of weight reduction to be married, and this is only applicable for rich families. The economical status in Gaza is very bad for most people. For patients to be involved in a special weight reduction program costs a lot of money, which patients preferred to spend on families.

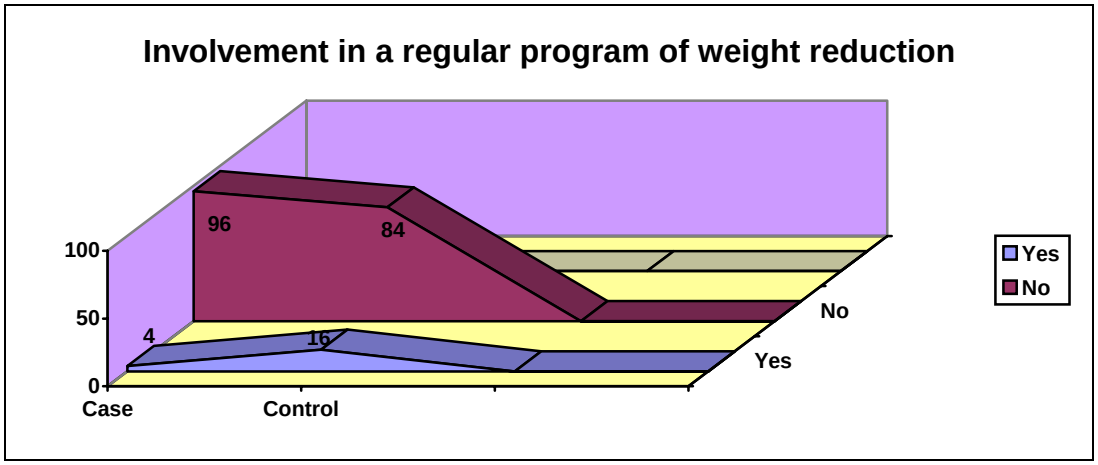


Figure No. (9)

8.2.8 Involvement in a regular program of exercise among the case and control groups

Most of the patients among the case group were non-compliant. We are living in a conservative society with some private ethics, rules and moral. It is strange and unacceptable to see people running in the street especially for women and old people. There are no specialized centers (gymnasium) in Gaza. Patients did not know that exercises are helpful in reducing systolic and diastolic blood pressure. On the other hand, we can see that more than half of the control group was non-complaint for the same reasons.

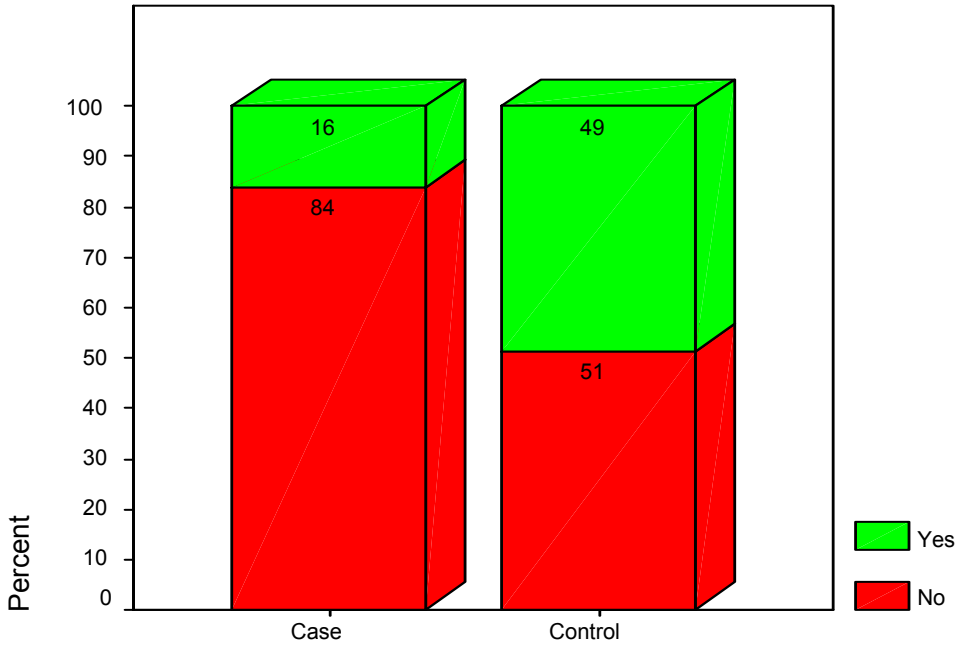


Figure No. (10)

8.2.9 Regular measurement of blood pressure among the case and control groups

Fifty four percent of the case group was compliant to regular measurement of blood pressure and 46% showed non-compliant. In comparison to the cases in the control group 79% was compliant and 21% showed non-compliant to regular measurement of blood pressure. The high compliance rate among the control group 79% in comparison to the case group 54% might be due to more knowledge of the importance of regular measurement of blood pressure in preventing hypertensive complications. More than half of both groups were complaint in comparison to weight reduction and exercise program because it is easy to measure blood pressure in the primary health clinic during the follow-up visits, and blood pressure machines are available in our markets with cheap price.

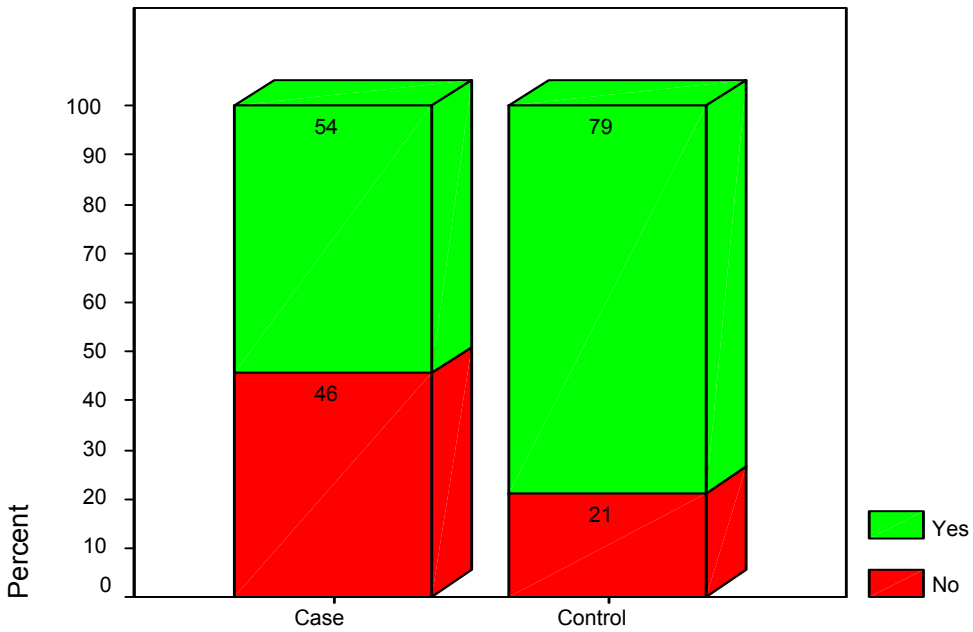


Figure No. (11)

8.2.10 Keeping follow-up clinic or physician appointment among the case and control groups

The majority of patients in the two groups were complaint. Generally, we have governmental clinics all over Gaza Strip. These clinics provide services and medication freely for chronic patients. This high compliance rate present in both groups is due to patients having to follow-up physician in order to take medication. Keeping in mind the security situation is the reason for the non-compliance rate of both groups. Most of the people in Gaza Strip did not visit any clinic unless they have a problem; they do not do preventive check up as in developed countries. Also the patients follow-up physician more when they face any undesired side effect of medication especially impotence in order to change their medication.

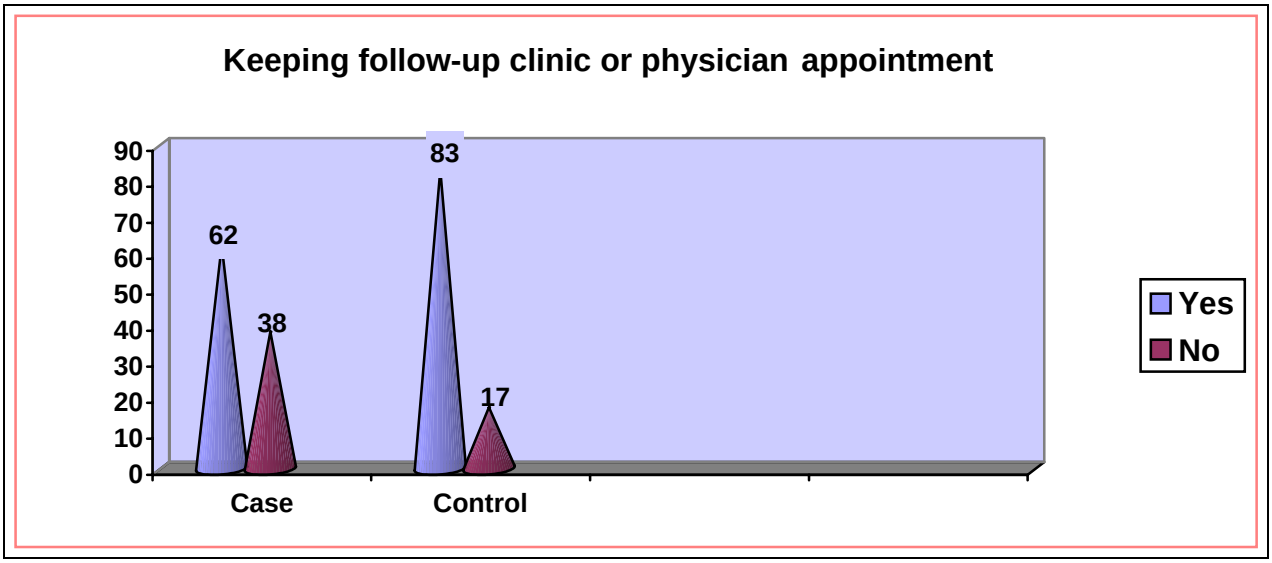


Figure No. (12)

8.2.11 Not smoking among the case and control groups

Approximately more than half of the study population showed compliance to not smoking in both groups. The strange outcome shown in figure No. (13) was amazing, because the Palestinian society is known to be a smoking society. We must keep in mind that half of the sample was female patients, and it is a strange and unacceptable for females to smoke in our culture. Also the Palestinian society is a religious one, and smoking is considered to be a sin and forbidden in Islam. This is mainly the reason for the low rate of non-compliance in both groups.

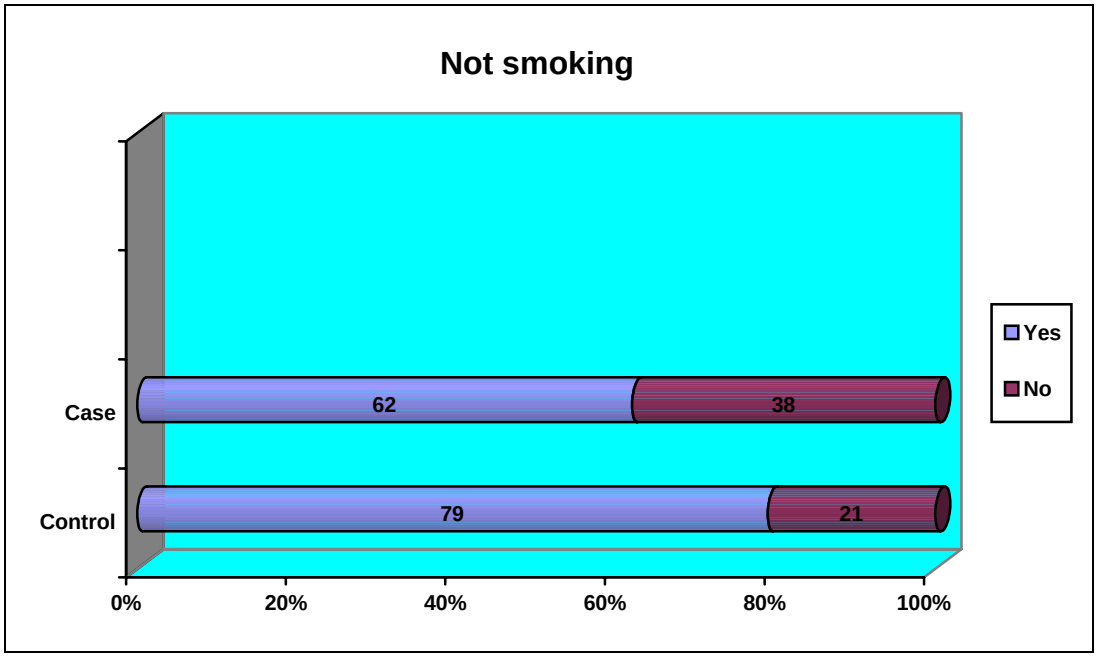


Figure No. (13)

8.3 Seasonal pattern and occurrence of stroke among the case group

This study discusses the relationship between seasonal pattern and development of stroke. Figure No. (14) shows time distribution of stroke among the case group. Thirty three percent of the case group developed stroke in wintertime, 28% in autumn, 24% in summer, and 15% in spring. Approximately two-third of the subjects among the case group developed stroke during winter and autumn time. As we know, the mentalities of individual differ during the four seasons. In winter and autumn people are more limited and isolated in their daily life activities, meanwhile in summer and spring people tends to be more active and out going. When the sunrise the people feel happy, optimistic, and more active, but at sunset, some people have negative feelings like sadness, pessimistic, and depression. Figure No. (40) shows that 91% among the case group was depressed, frustrated, desperate, and anxious. This result matches with other previous studies that found a significant association between increasing scores on the modified version of the Center for Epidemiological Studies Depression Scale (CES-D) and the incidence of stroke (RR=1.04;95% CI 1.01-1.09) [143]. Also Ohira et al. showed that persons with Self-Rating Depression Scale (SDS) scores in the high tertile had twice the age and sex adjusted relative risk of total stroke as those with scores in the low tertile (RR= 1.9; 95% CI 1.1-3.5) [144].

As we see in figure No. (14), most of the cases developed stroke in winter and autumn, which are known to be more depressive. In addition, this result matched with other studies, which found an evidence relationship between winter [113] and autumn [112] and development of stroke. However, other

investigations found no evidence supporting seasonal variation in stroke rates [111]. In summer, we found that 24% of the cases developed stroke, this might be due to exposure to stressful situations related to more activity during day life, and high temperature and humidity. Stress increases blood pressure, which in turn leads to developing of stroke as proven by other literatures [66, 3]. On the other hand, it differed with other literatures, which have reported that there is little medical evidence that stress causes stroke [1].

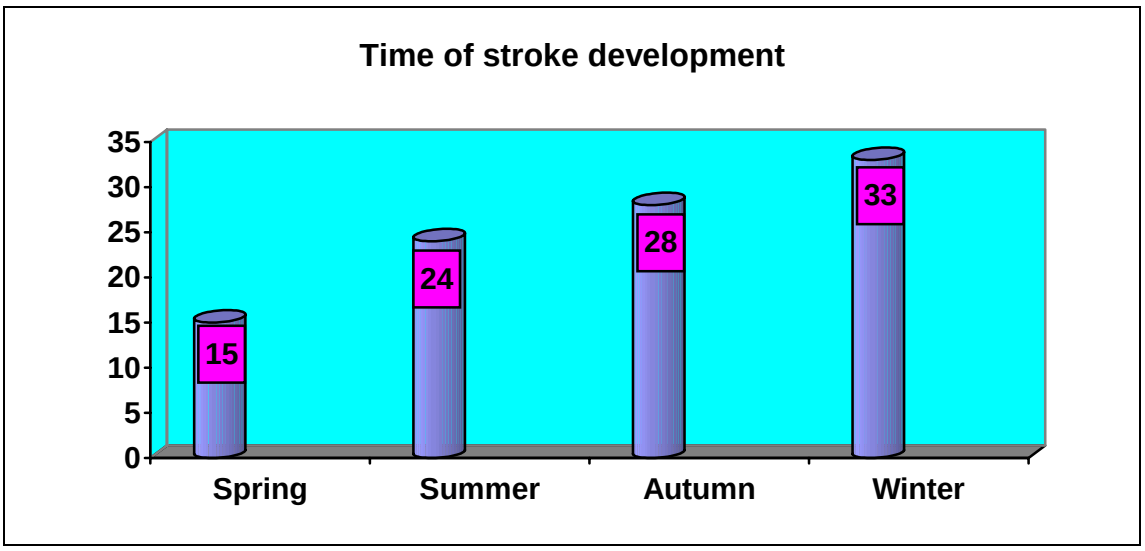


Figure No. (14)

8.4 Percentages of quality of life (QOL) among the case and control group

The WHOQOL–BREF twenty-six questionnaires were used in this study to provide a comprehensive assessment, measuring the impact of disease and impairment on daily activities and behavior. It is anticipated that the WHOQOL used in broad–ranging ways, and allowed detailed quality of life data to be gathered on a particular population, facilitating the understanding of diseases, and the development of treatment methods. This instrument can be used as a comparative study in two or more countries on the relationship between health care delivery and quality of life requires an assessment yielding cross-culturally comparable scores [145]. In Clinical practice, the WHOQOL instrument assists the health care providers (Doctors, Nurses, Physiotherapist, and Clinicians in general) in making judgments about the area in which a patient is most affected by disease, and making treatment decisions. In some developing countries where resources for health care may be limited, treatment aimed at improving quality of life through palliation, and it can be effective and inexpensive [146]. The WHOQOL-BREF produces a quality of life profile, and it is included four domain scores (physical, psychological, social relationships, and environment). Explicit instructions, explanations, and questionnaires, which related to the four domains, are given in Table 11. There are also two items that are examined separately: question 1 asks about an individual's perception and rating their quality of life, and question 2 asks about an individual's overall perception of their health. The four domain scores denote an individual's perception of quality of life in each particular domain. Also the domain scores are scaled in a positive direction (higher scores denote higher quality of life, and lower scores denote lower

quality of life). The mean score of items within each domain is used to calculate the domain score [145].

Table 11 Quality of life domains

Domain	Facets incorporated within domains
1. Physical health	a. Activities of daily living b. Dependence on medicinal substances and medical aids c. Energy and fatigue d. Mobility e. Pain and discomfort f. Sleep and rest g. Work capacity
2. Psychological	a. Bodily image and appearance b. Negative feeling c. Positive feelings d. Self-esteem e. Spirituality/ Religion/ Personal beliefs f. Thinking, learning, memory and concentration
3. Social relationships	a. Personal relationships b. Social support c. Sexual activity
4. Environment	a. Financial resources b. Freedom, physical safety and security c. Health and social care: accessibility and quality d. Home environment e. Opportunities for acquiring new information and skills f. Participation in and opportunities for recreation/ leisure activities g. Physical environment (pollution/ noise/ traffic/ climate) h. Transport

(WHO, 1996)

8.4.1 Rating quality of life

The patients were asked to rate their QOL on a scale from very poor to very good. Approximately half of the study population had good and very good QOL among the control group compared with more than one third among the case group. In the control group, we see about 54% have rated their QOL as good and very good, meanwhile 41% among the case group did so. More compliance with the therapeutic regimen among the control group made their QOL better in comparison to the case group. On the other hand, the non-compliance in the case group gave us a high percentage 20% of poor and very poor QOL rate in comparison to the QOL rate in the control group 9%.

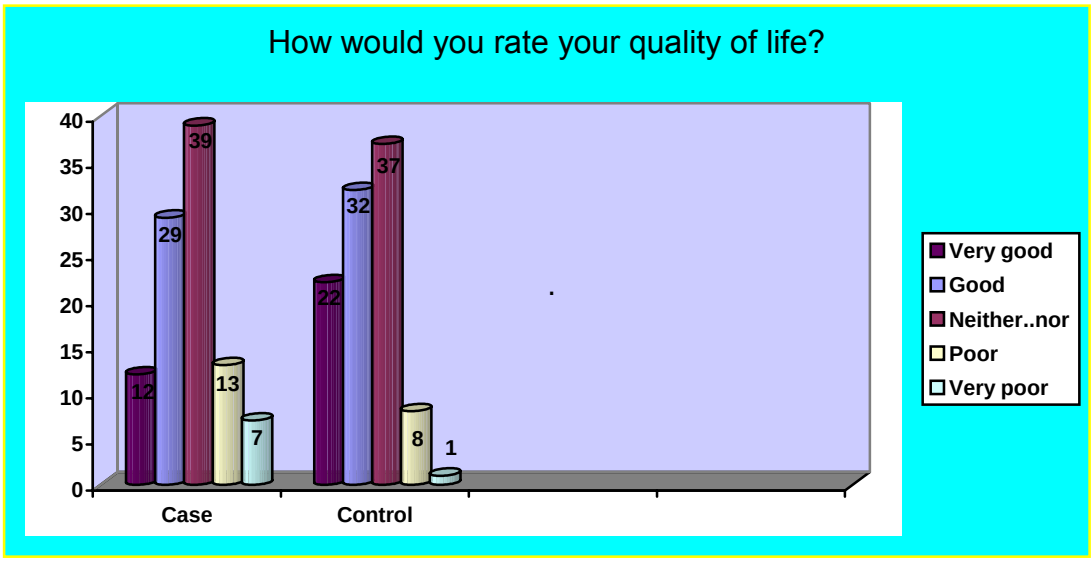


Figure No. (15)

8.4.2 Satisfaction with health

The patients were asked to rate their satisfaction with health on a scale from very dissatisfied to very satisfied. More than two third of the control group was satisfied and very satisfied with their health, meanwhile less than one third of the case group was so. Commitment to the therapeutic regimen gave us the high percentage of satisfaction with health status among the control group. On the other hand, we see the opposite ranges of dissatisfaction regarding health status about 63% was dissatisfied with their health among the case group compared to 20% of dissatisfaction in control group.

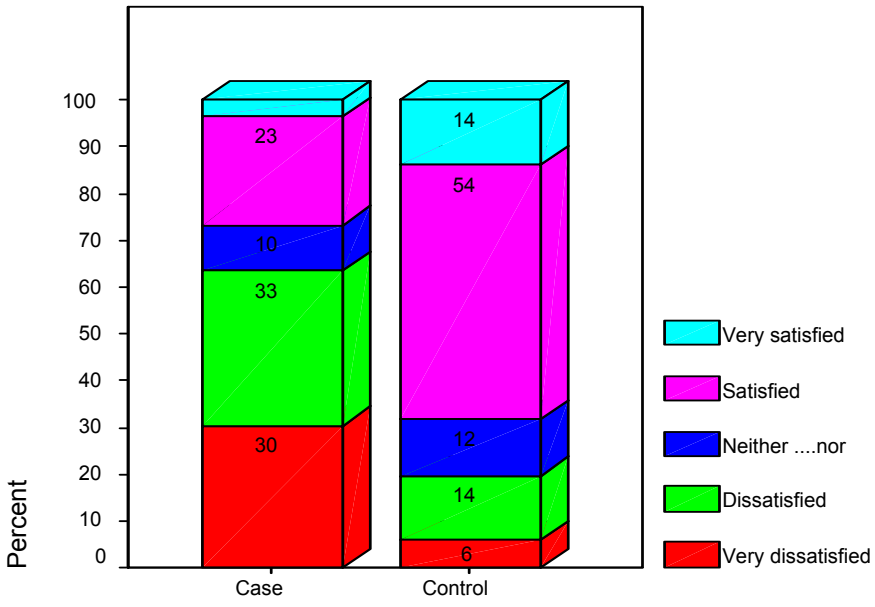


Figure No. (16)

8.4.3 Physical pain that prevents you from doing your needs

The patients were asked to rate how much they have experienced a physical pain that prevents them from doing their needs on a scale from not at all to an extreme amount. Hypertension is a serious problem, which can cause some signs and symptoms such as headache, tinnitus, general weakness, and dizziness. These signs and symptoms can impair the activity of daily living for patients. As proven before, compliance to taking the medication as prescribed (figure No. (3) and at proper time (figure No. (4)) among the control group made the pain disappear, so 63% of the control group patients had no impairment or a little in their activity of daily living compared to 19% of the case group. Less compliance to take the medication as prescribed and at proper time made 68% among the case group have physical pain, which prevented them from practicing their ADL compared to 20% of the control group.

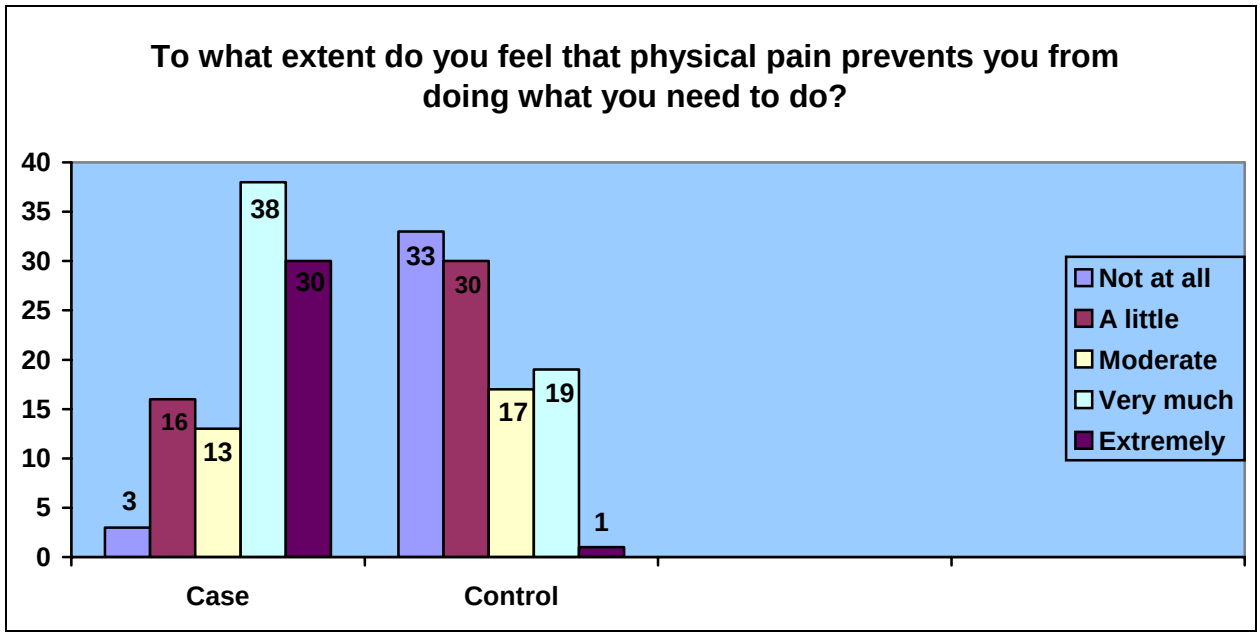


Figure NO. (17)

8.4.4 Medical treatment to function in daily life

The patients were asked to rate how much they have experienced a need of medical treatment to function their daily life on a scale from not at all to an extreme amount. Almost half of the control group found their self of a little or no need of medical treatment to function in their daily life in comparison to 14% among the case group. As we know, people seek medical treatment when they face any medical problem. Since the control group has proven to be more complaint with the therapeutic regimen than the case group, this made them less asking for medical treatment in order to function in daily life. Low percentage of compliance with the therapeutic regimen among the case group made their function in daily life impaired and 60% of them to seek medical treatment.

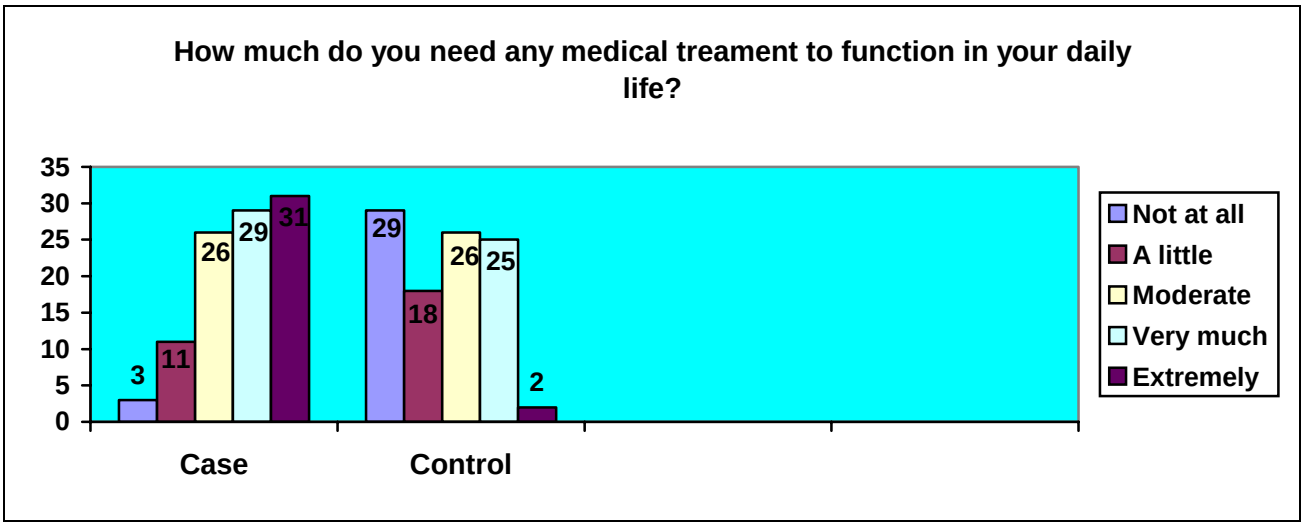


Figure No. (18)

8.4.5 Enjoying life

The patients were asked to rate how much they have experienced an enjoyment of life on a scale from not at all to an extreme amount. For more than 2 years, the Palestinian people in Gaza and West Bank are living under extremely stressful and inhuman circumstances. Incursion, curfew, closure, assassination, demolition of houses, and destruction of infrastructure become the major aspect of daily life, so enjoying life was unattainable. As we see in figure No. (19), there were no big differences in the way of enjoying life between both groups except the 25% of the control group who said that they extremely enjoying their life. This could be due to some special circumstances such as they have the ability and permission to pass through the checkpoints, travel a broad, and going to the seashore. The seashore is the only recreational place in Gaza Strip. Some areas in Gaza Strip mainly southern sector are forbidden for Palestinian, because of the Jewish settlements.

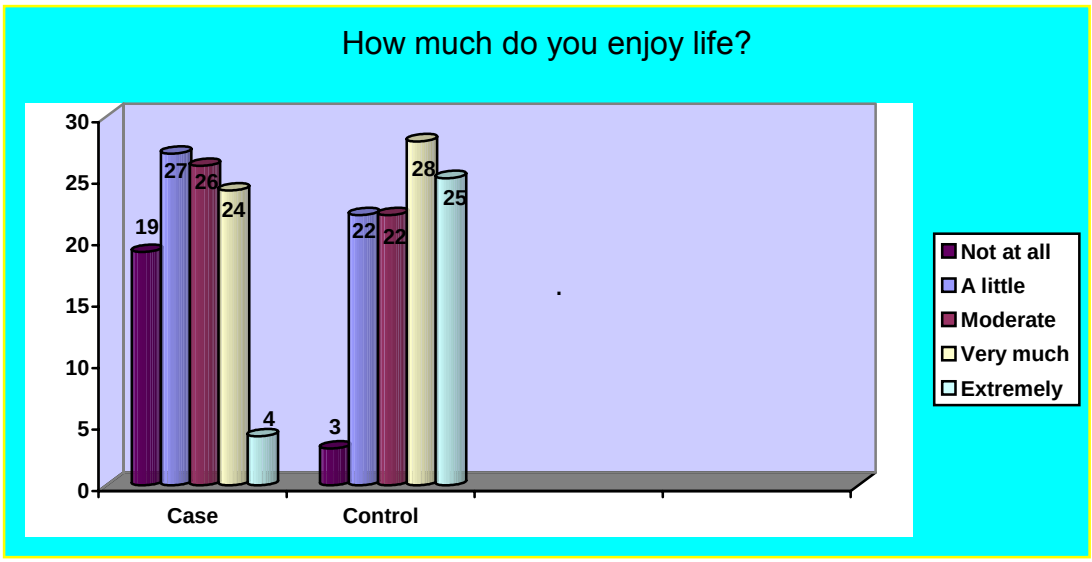
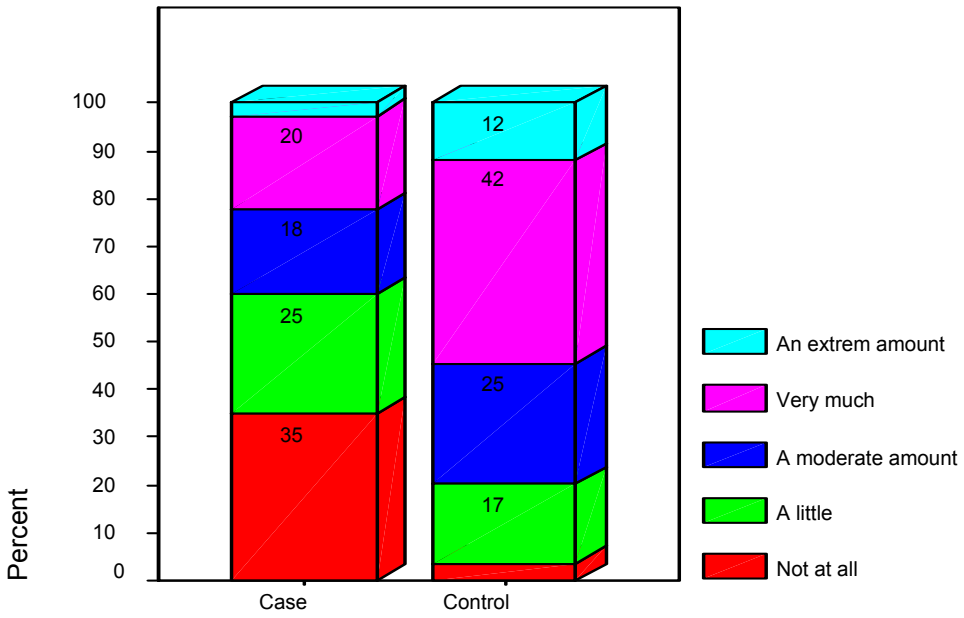


Figure No. (19)

8.4.6 Meaningful of life

The patients were asked to rate their meaningful of life on a scale from not at all to an extreme amount. Perception of chronic disease differs from person to person. Accepting the disease and living with it plays an important role in the coping process. Figure No. (20) shows the majority of the case group feels that their life is unmeaning in away or another. The society looks to the chronic disease patients as disabled persons, which affect the way the patients feel about their existence and value. This implemented mainly over the female patients who feel threatened of being divorced or their husbands could get married to another healthy woman as this allowed in Islam. More than half of the control group feels their lives are meaningful because they feel that they are still productive and socially involved in public life and decision-making.



To what extent do you feel your life to be meaningful?

Figure No. (20)

8.4.7 Ability to concentrate

The patients were asked to rate their ability of concentration on a scale from not at all to extremely. Uncontrolled blood pressure and its symptoms affect patient's life in general. Patients who are taking antihypertensive medication maintain their blood pressure in normal range, which will help them avoid the complications of sever hypertension which will improve their level of concentration. About half of the control group experiences a very good level of concentration because they were more compliant to antihypertensive medication than the case group. The low percentage of concentration among the control group could be due to the adverse reaction of antihypertensive treatment such as dizziness and fatigue.

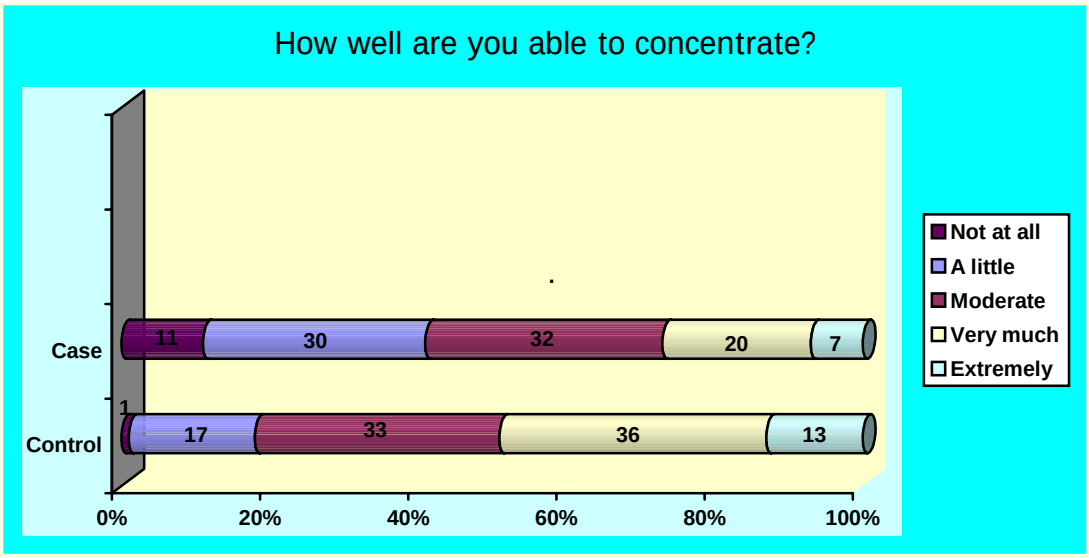


Figure No. (21)

8.4.8 Feeling safety in daily life

The patients were asked to rate their feeling of safety in daily life on a scale from not at all to extremely. Among the case group, 9% was extremely feel safe in their daily life, 30% very much, 31% a moderate amount, 22% a little, and 8% not at all feel safe in their daily life. In comparison to the cases in the control group 13% was extremely feel safe in their daily life, 38% very much, 33% a moderate amount, 13% a little, and 3% not at all feel safe in their daily life. As people in Gaza Strip are living under very stressful situation for more than two years, people exposed to physical or emotional trauma at any time. As we see in figure No. (22), there are no big differences between the case and control groups about their feeling of safety in their daily life. Taking antihypertensive medication will not prevent completely a sudden increase or decrease in blood pressure due to a sudden emotional trauma. The low percentage of feeling unsafely in both groups could be due to the aging process.

Figure No. (22)

8.4.9 Healthy of physical environment

The patients were asked to rate how much they have experienced a healthy physical environment on a scale from not at all to extremely. Gaza Strip considered the highest density rate of population all over the world. The environment of Gaza Strip is unhealthy for every body because of air pollution, noise pollution, unhealthy sewage system, and over population. There are eight refugee camps in Gaza Strip, and these camps do not meet the lowest healthy standard for human. As we see in figure No. (23) a considerable amount of patients in both groups felt that their physical environment is unhealthy, because of the previously mentioned reasons. Also this result was expected because UNRWA built most houses a long time ago. Crowded houses and bad ventilation decrease the health status of physical environment. On the other hand we see that a good amount of patients in both groups have a better physical environment because they live in the city, and had the ability to improve their physical environment by building a healthy houses.

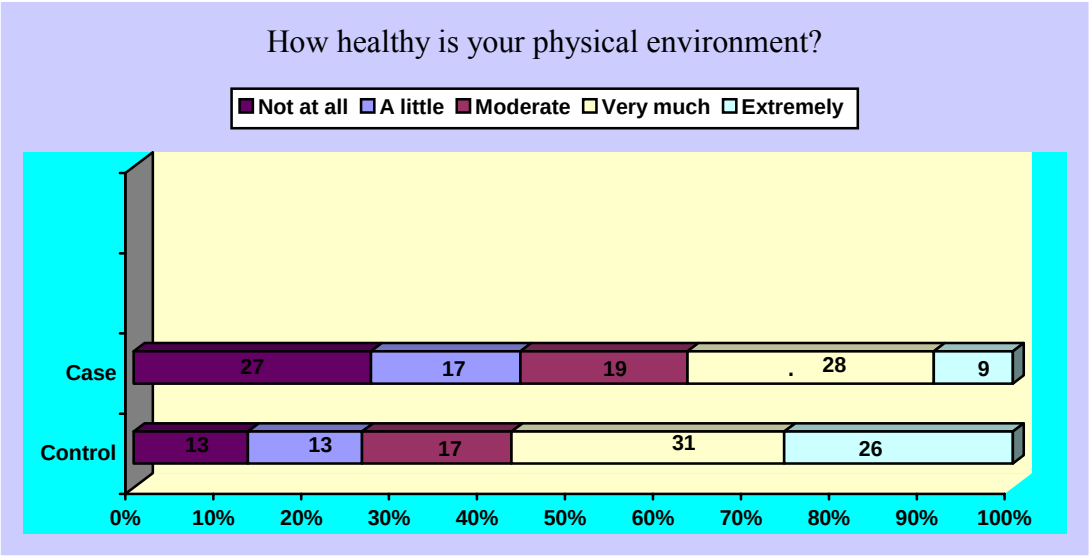


Figure No. (23)

8.4.10 Energy for daily life

The patients were asked to rate how completely they have experienced enough energy for everyday life on a scale from not at all to completely. Human being is mentally, socially, and physically unique. The result in figure No. (24) shows how different patients cope with the disease and how different the disease affects their practice of life. Almost one third of the case group felt that they not at all had enough energy to function their life. Meanwhile only 3 % of the control group felt the same. On the contrary almost two third of the control group had mostly and completely the energy to function normally in comparison to the case group (20%). This is due to the high compliance rate to some parts of the therapeutic regimen.

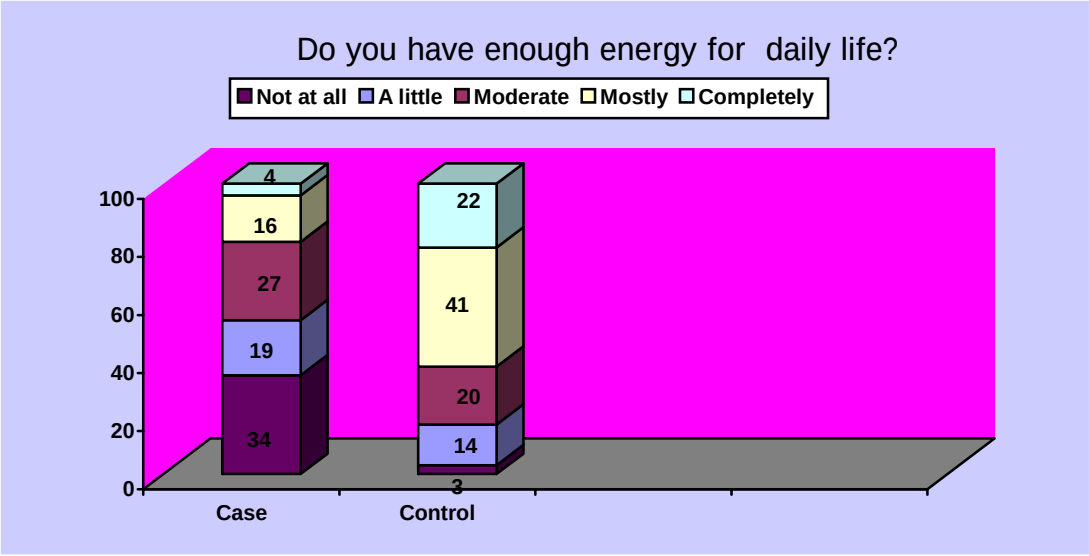
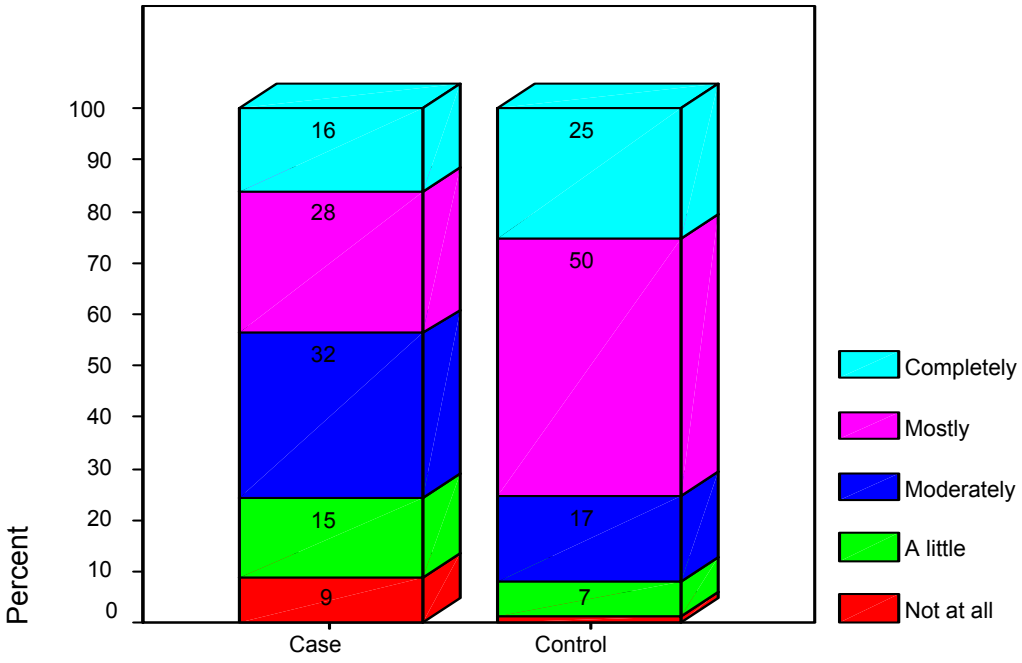


Figure No. (24)

8.4.11 acceptance of bodily appearance

The patients were asked to rate how completely they have experienced the ability to accept bodily appearance on a scale from not at all to completely. As Moslems acceptance of the disease and its effect on the body appearance is a part of our religion. Believing in the faith and destiny is the main cause of high rate of acceptance between the two groups. Moslems believe that disease and death is God's well. This is proven in the diagram, as only 1% of the control group and 9% of the case group did not accept their bodily appearance.



Are you able to accept your bodily apperance?

Figure No. (25)

8.4.12 Enough money to meet your needs

The patients were asked to rate how completely they have experienced enough money to meet their needs on a scale from not at all to completely. Even though the economical status in Gaza is very bad especially during uprising, we did not see a major impact of this issue on the result of this study. The amount of money needed to meet our needs differ from person to person. People in Gaza Strip do not have luxurious life. During uprising, the international community greatly contributed to fund the basic life needs such as rice, flowers, cooking oil, sugar, and canned foods. Sometimes some money is distributed to unemployed workers. This aids of the international community substituted the low-income rate. For the above reason we see the majority of the control group and about half of the case group did not face any serious problem meeting their needs.

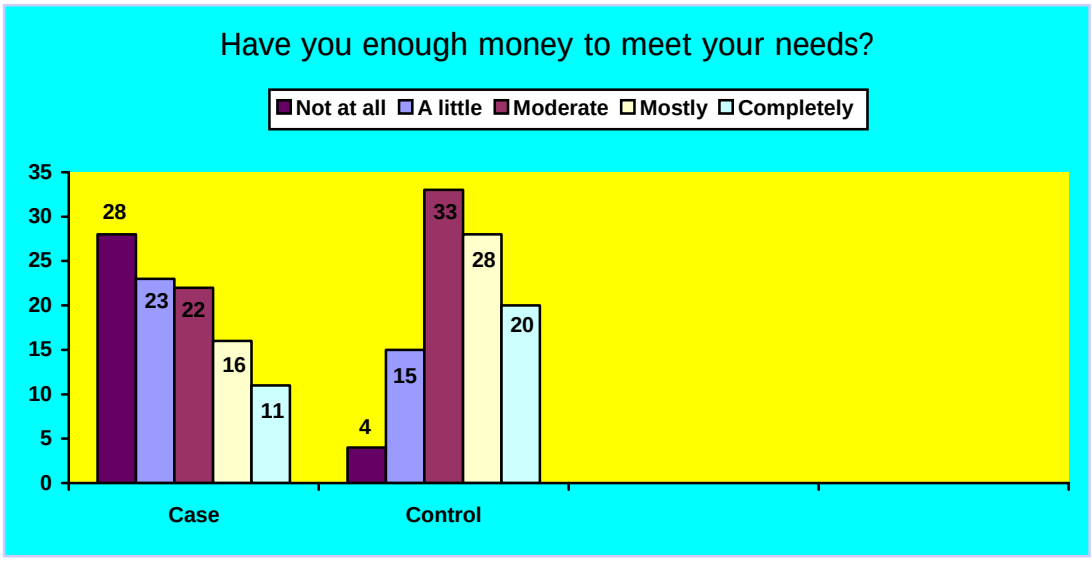


Figure No. (26)

8.4.13 Availability of daily life information

The patients were asked to rate how completely they have experienced the availability of information they need in their daily life on a scale from not at all to completely. Eighty three percent of the control group and 64% of the case group stated that they could get enough information in day-to-day life regarding their disease. Even though there were some difficulties to move around during uprising, we still see high rate of well-informed patients. This does not reflect a high level of health education standard in our society, but because our society is considered to be socially attached. Patients in both groups could get information from relative or neighboring health professional personnel. We still have some leaflet regarding the disease and its complications, but these publications are not enough or may not reach every single one of the groups. This is the main reason of having the low rate of misinformed patients between the two groups.

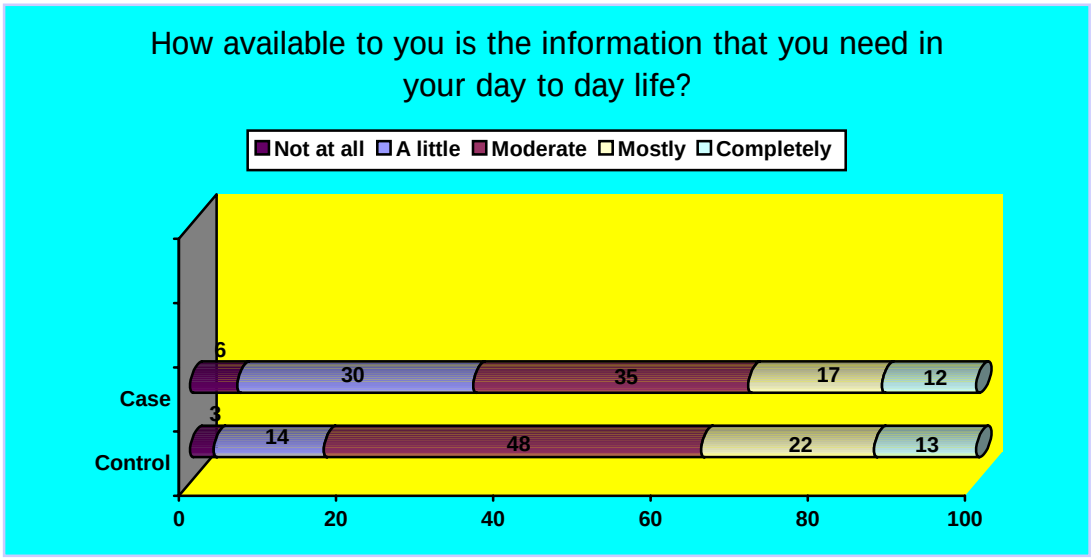


Figure No. (27)

8.4.14 Opportunity for leisure activities

The patients were asked to rate how completely they have experienced the opportunity for leisure activities on a scale from not at all to completely. High compliance rate with the therapeutic regimen among the control group in comparison to the case group especially taking the medication as prescribed and at proper time made it easy for them to avoid blood pressure complications such as dizziness, fatigue and headache. This gave them an opportunity and motivation to enjoy some leisure activities like going to the café shops, seashore, and traditional games like cards, chess, and dominos. Some patients felt isolated because their way of accepting the disease which inhibited them from performing the leisure activities. This is seen mainly among the case group 37% in comparison to control group 22%.

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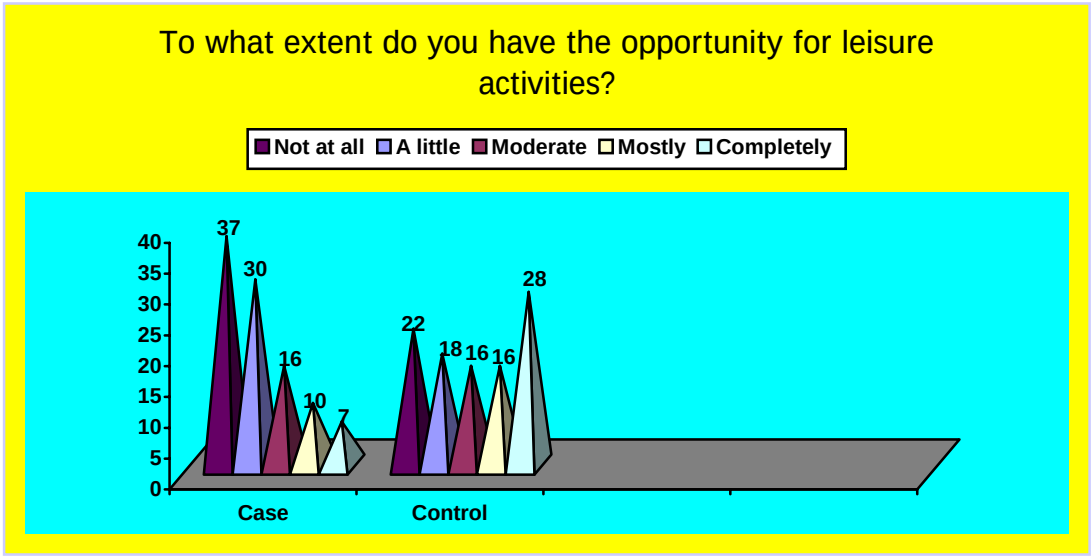

Figure No. (28)

8.4.15 Ability of getting around

The patients were asked to rate how completely they have experienced the ability of getting around on a scale from very poor to very good. Among the control group, 64% felt freely moving around in comparison to 40% in the case group. This does not mainly reflect the state of health of the patient. In our society, old people play a major role in decision-making regarding social occasion like wedding, funerals, and problem solving. Even the patients were sick they felt socially obliged to participate in such occasions. This also explains the low percentage among the control group 8% and the case group 28%.

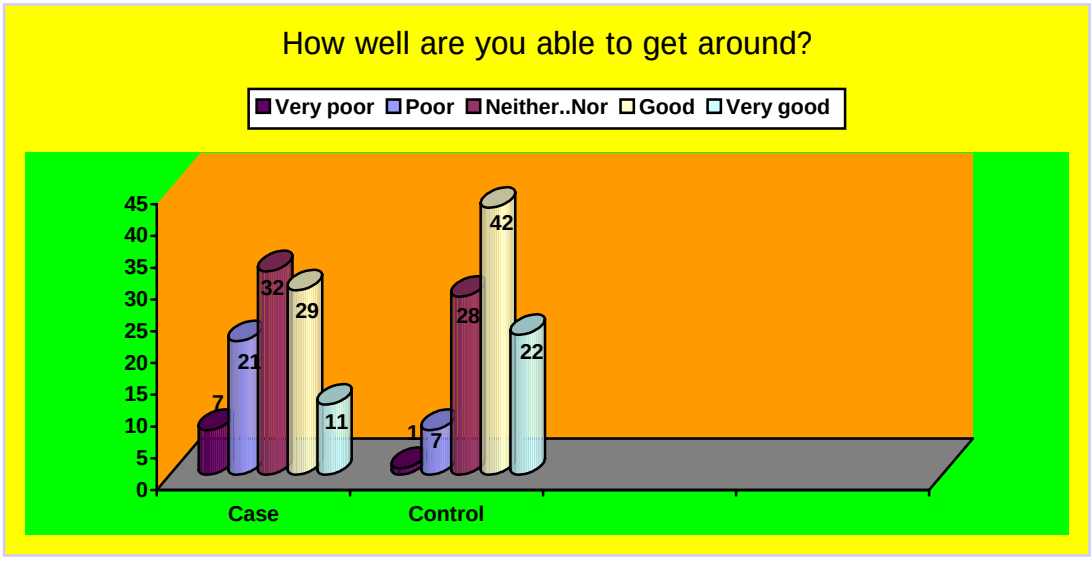

Figure No. (29)

8.4.16 Satisfaction with sleep

The patients were asked to rate their satisfaction with sleep on a scale from very dissatisfied to very satisfied. As we know the situation in Gaza Strip was very bad during the last two years, almost every night we lived under bombardment and incursion, but still we see extremely an amazing result. More than 80% of the control group and 50% of the case group were satisfied and very satisfied with their sleeping pattern. Faith and dependence on God, which gave them self-settlement, was good reason for this result. High compliance with the therapeutic regimen among the control group made some differences with the case group regarding sleeping satisfaction.

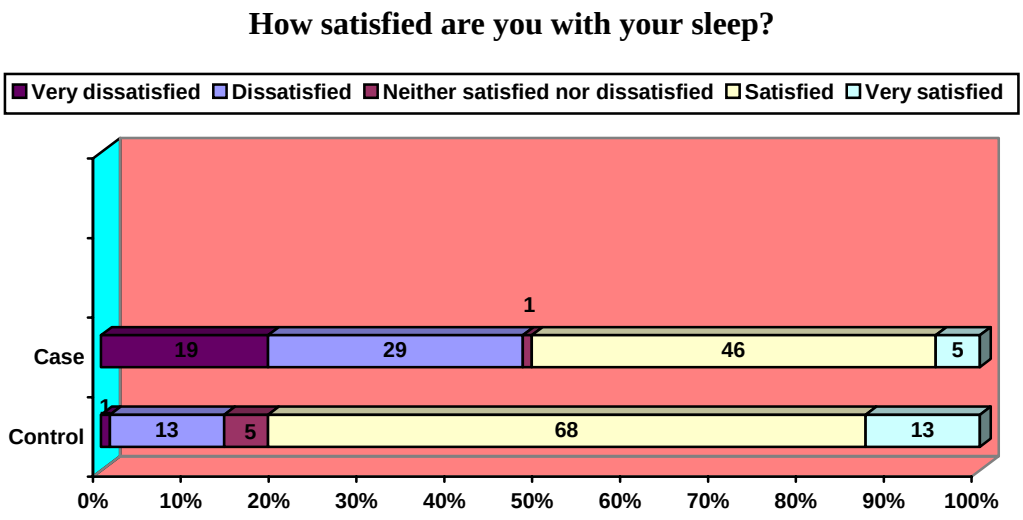

Figure No. (30)

8.4.17 Ability to perform ADL

The patients were asked to rate their satisfaction with the ability to perform ADL on a scale from very dissatisfied to very satisfied. The majority of the control group 78% was completely satisfied with their performance of daily life activities, and none was very unsatisfied. Meanwhile a minority of about 13% was unsatisfied. This might be because of their high compliance rate with the therapeutic regimen, which decreased the hazards of the disease. On the other hand, almost half of the case group was satisfied and the other half was unsatisfied with 9% who was very unsatisfied. The reason for this result was a low compliance rate with the therapeutic regimen.

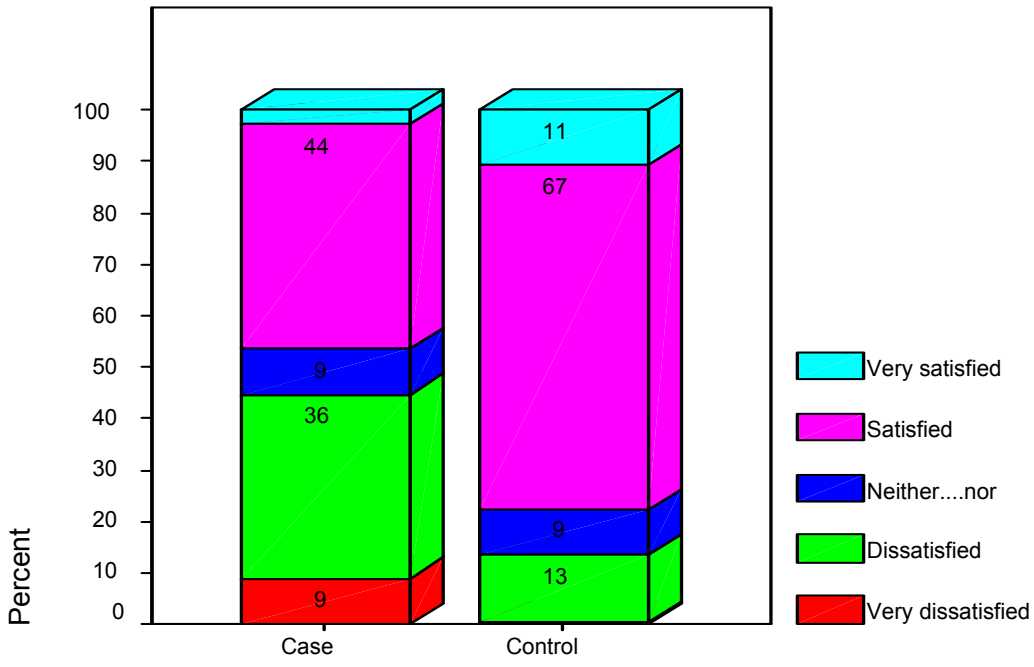

Figure No. (31)

8.4.18 Satisfaction with the capacity for work

The patients were asked to rate their satisfaction with the capacity for work on a scale from very dissatisfied to very satisfied. As we see in figure No. (17) physical pain, which prevents you from doing what you need to do, we can imagine the relation between pain and capacity for work. In the control group, the ratios for the two aspects were relatively close. As pain had no influence on their activity of daily life that made it better for their capability of performing their jobs. This can be seen obviously in this figure as 71% of the control group was satisfied with their capacity for work. If we look at figure No. (21), we can see that 41% of the case group was unable to concentrate properly which negatively affected their capacity of work as we see figure No. (32).

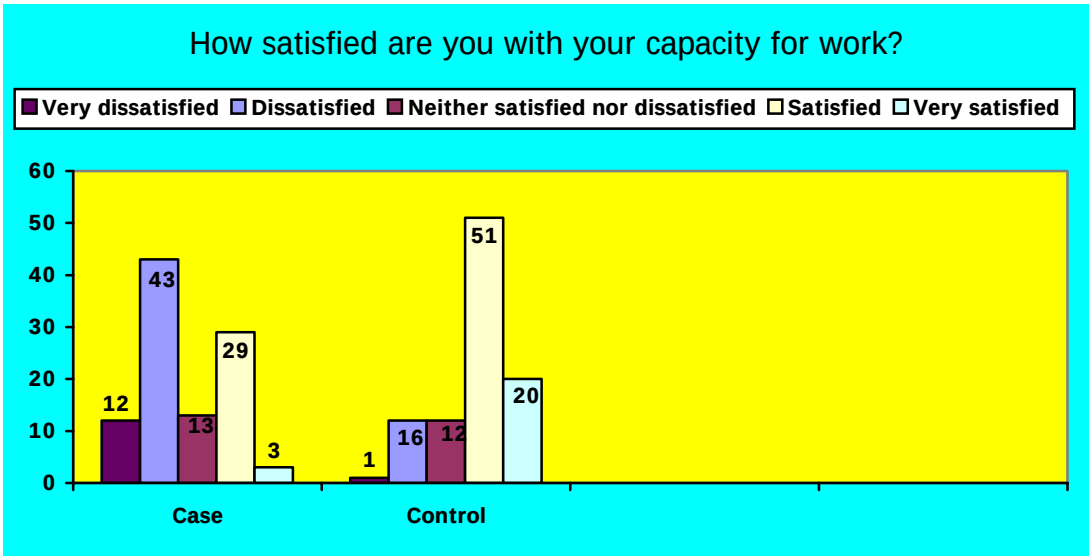

Figure No. (32)

8.4.19 Satisfaction with yourself

The patients were asked to rate their satisfaction with themselves on a scale from very dissatisfied to very satisfied. Patients differ from healthy people of how they understand self-satisfaction. Chronic patients will feel self satisfied if they could perform activity of daily life properly such as (eating, bathing, visiting friends, working and ext…), they will not ask for luxurious life to achieve self-satisfaction. This is proven by the result in figure No. (33), as 88% of the control group was completely satisfied with their self, even in the case group more than half was satisfied. The differences between the two groups are due to the way individual accept the disease, live and cope with it, and how they manage to live normally with the disease.

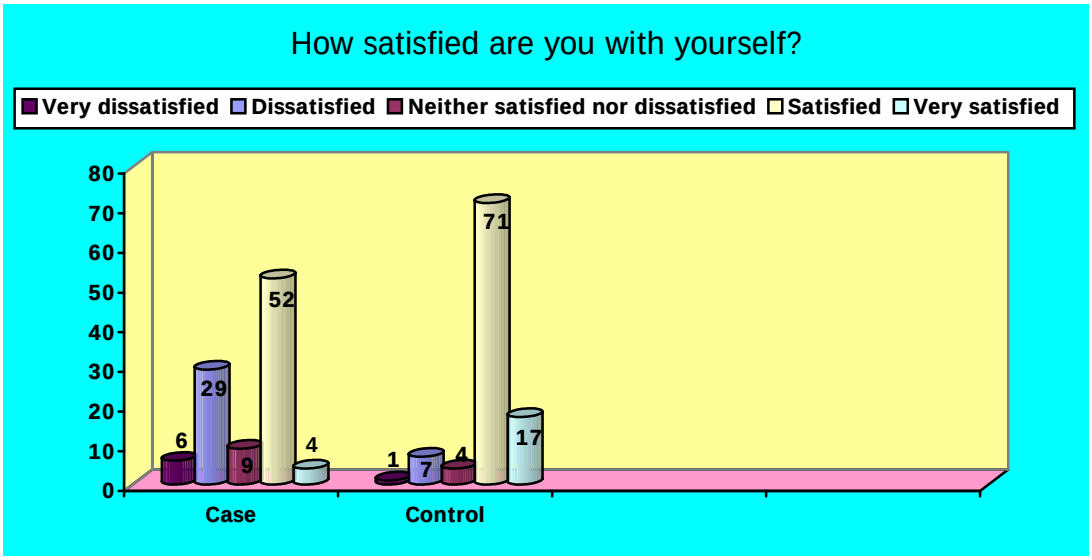

Figure NO. (33)

8.4.20 Satisfaction with personal relationships

The patients were asked to rate their satisfaction with personal relationships on a scale from very dissatisfied to very satisfied. As we mentioned before, we are living in a well-related society. Social relationships are highly appreciated in our society, even patients feel obliged to relate with others. This is the reason for the high rates of satisfaction with personal relationships among the two groups. Nevertheless, we still see a small rate of unsatisfied patients; this might be due to individual reasons like depression, frustration, and withdrawal.

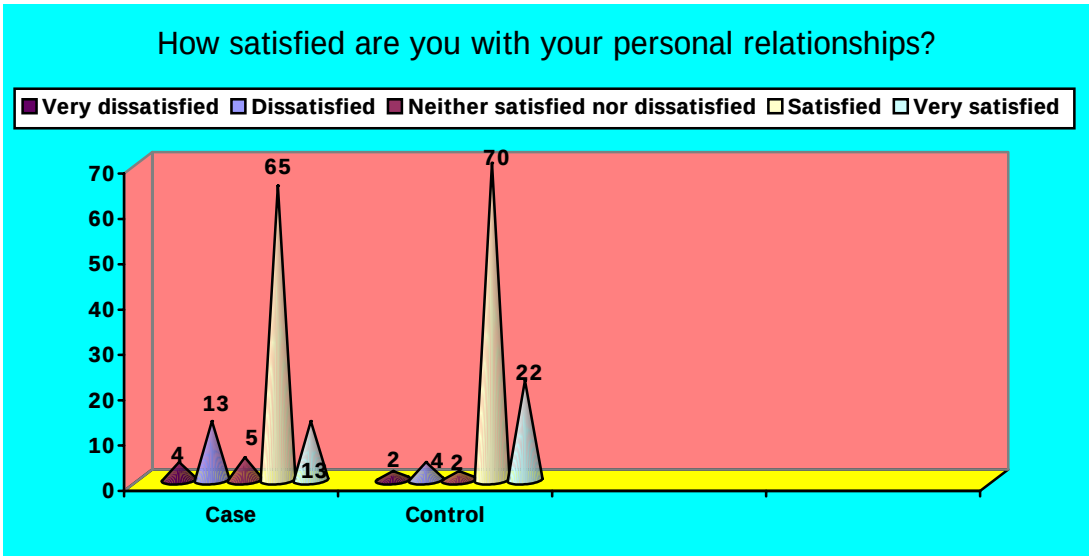

Figure No. (34)

8.4.21 Satisfaction with sexuality

The patients were asked to rate their satisfaction with sex life on a scale from very dissatisfied to very satisfied. Human sexual activity serves a complex need for personal expression and gratification with numerous psychological, social, and esthetic implications. In general, people have an idea that antihypertensive drugs cause sexual impairment. In fact, some

antihypertensive medication may cause impotence as undesired side effect. We expected the result of this study to match with the previous idea, but amazingly, it did not. We expected the patients in case group who were less compliant to taking antihypertensive medication as prescribed and at proper time to be more satisfied with their sexual life, but the study showed that 28% of the case group was satisfied with their sexual life. Meanwhile the control group who had antihypertensive medication as prescribed and at proper time had a better rate of satisfaction of sexual life. The results of this scientific study motivate us to provide health educators and physician a new idea about how compliance with the therapeutic regimen is helpful to improve patient's quality of life in general and specifically sexual life. Health educators and physicians have to transform this idea to the patients and people in general.

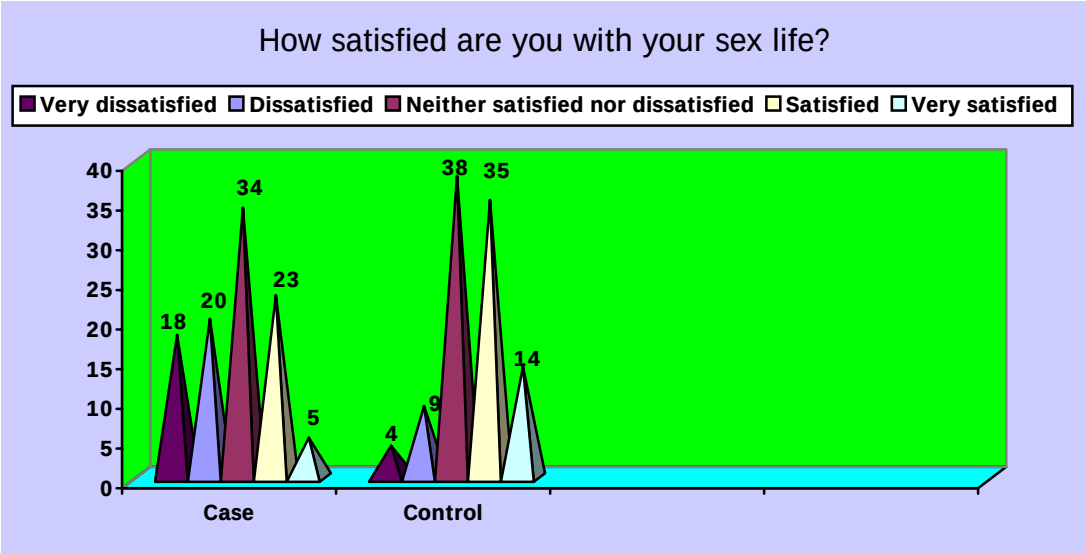

Figure No. (35)

8.4.22 Satisfaction with the support of your friends

The patients were asked to rate their satisfaction with the support they got from friends on a scale from very dissatisfied to very satisfied. Our society depends mostly on social and individual relationships. Friendship relations are very strong among all society segments. Generally, people support each other especially when some body is sick, they would visit each other and give emotional and even financial support if possible. This was seen obviously in figure No. (36), as 91% of the control group were satisfied with their friends. On the other hand, we see unexpected result as 51% among the case group were unsatisfied with their friends. This is due to the state of depression, as we see in figure No. (40). Non-acceptance of the disease, low self-esteem, feeling of isolation, and despair are other reasons.

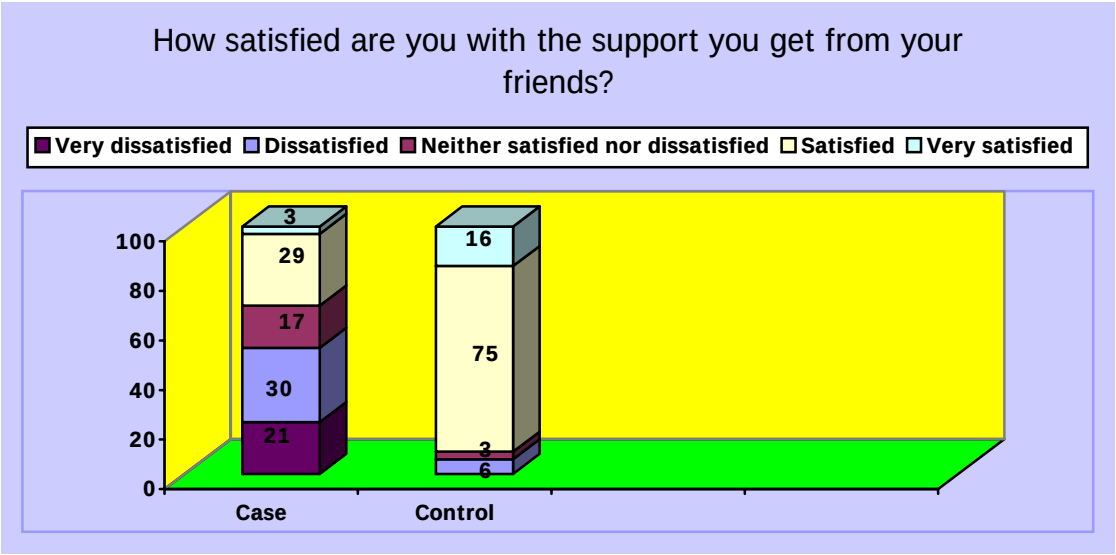

Figure No. (36)

8.4.23 Satisfaction with living place

The patients were asked to rate their satisfaction with the living places on a scale from very dissatisfied to very satisfied. Even though a considerable amount of both groups were unsatisfied with their physical environment as shown in figure No. (23). Figure No. (37) shows considerable amounts of both groups which are satisfied with the conditions of their living place. This result was unexpected, but I believe that people are trying to accept the conditions of their living place, because they are unable to change, and they have to cope and modify their life to meet their needs. The rate of un-satisfaction in both groups is understandable as we think people may have problems with their neighbors, location of the living places (risky areas), and crowdedness of the neighborhood.

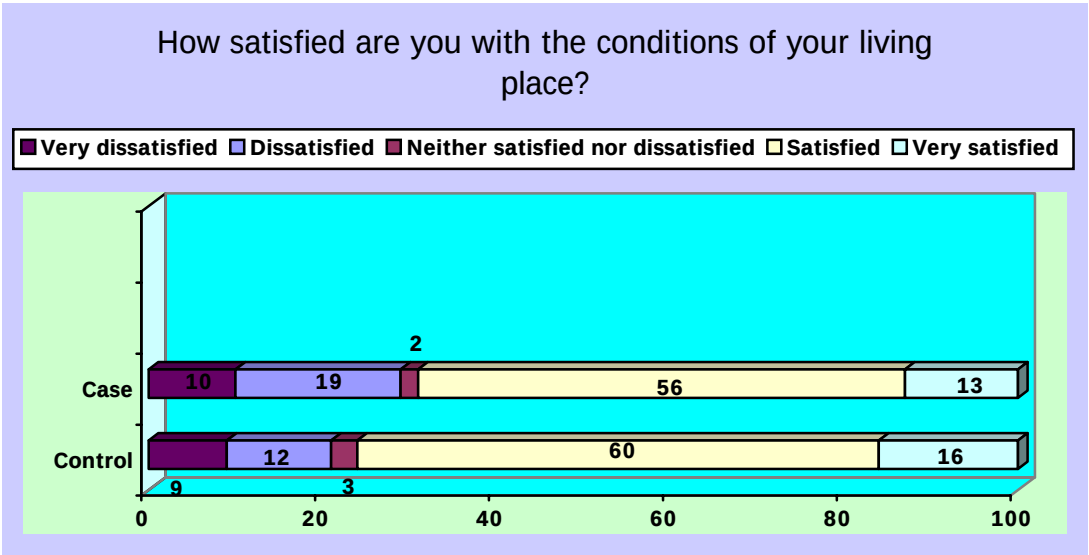

Figure No. (37)

8.4.24 Satisfaction with the health services

The patients were asked to rate their satisfaction with the access to health services on a scale from very dissatisfied to very satisfied. Logically every body has the right to receive health services all over the world. This differs from place to place. In developed countries, every person has the access to health services with high level of quality care; meanwhile in developing countries, not every one has the same access for many reasons (war, poverty, illiteracy, ignorance, and political instability). In Gaza Strip, we have few hospitals, and many primary health clinics are distributed all over Gaza Strip. Even though primary health clinics are accessible, we still have about 41% of the case group was un-satisfied with their access to health services, this does not mean that these people did not get an access to health services, but it means that they faced many difficulties such as closure, curfew, and incursion. Another reason for un-satisfaction is the high number of patients compared with low number of physicians and health providers.

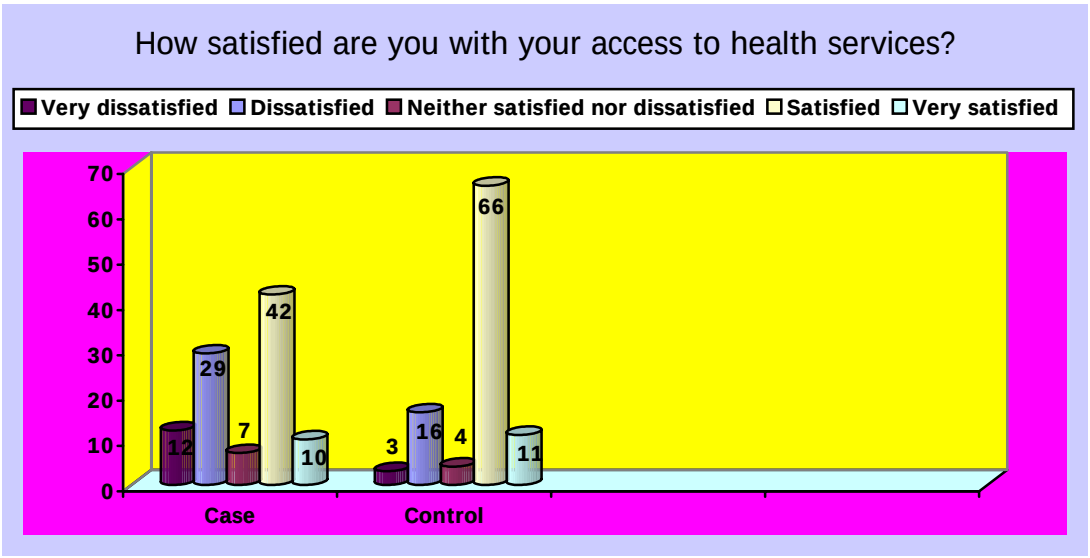

Figure No. (38)

8.4.25 Satisfaction with transportation

The patients were asked to rate their satisfaction with transportation on a scale from very dissatisfied to very satisfied. The majority of the control group 78% was satisfied with their transport; meanwhile about one third of the case group was satisfied. Both groups had the ability to reach health services in a way or another. Seventy-eight percent of the control group had easier transport system because they might have private cars, meanwhile 56% of the case group had some difficulties might made them feel un-satisfied for example they did not have private cars, and they had to walk some distances to reach the transport station. Some people had very bad financial situation made them unable to afford transport fees.

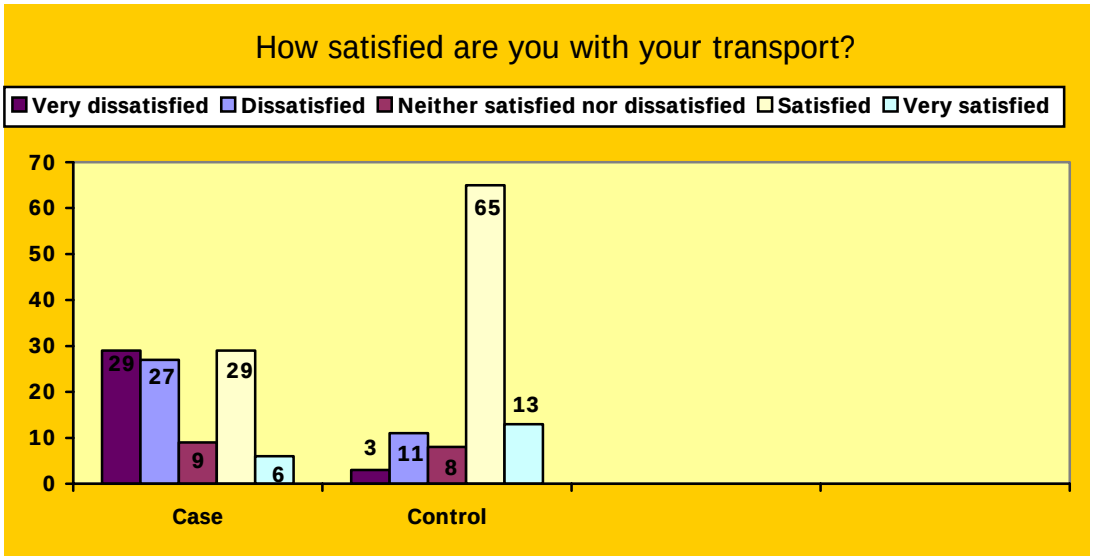

Figure No. (39)

8.4.26 Experienced of negative feelings

The patients were asked to rate how often they have experienced a negative feeling such as blue mood, despair, anxiety, and depression on a scale from never to always. Depression and depressive symptoms are significant health care problems and it occurs frequently in the elderly medically ill [147]. A long the study we have seen that the quality of life among the control group is relatively high in physical, psychological, social, and environmental domains compared to the case group. Ninety one percent of the case group had the negative feeling of blue mood, despair, anxiety, and depression. This gave us a clue to why they had low QOL rate. As we know, depression affects daily life activities such as sleeping, walking, eating, concentration, leisure activities, and social relationships.

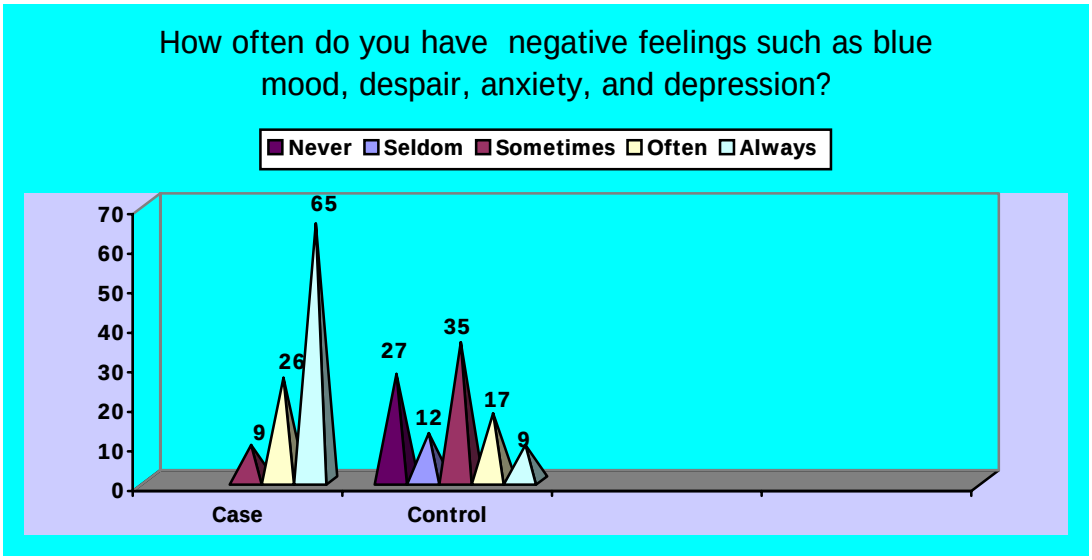

Figure No. (40)

8.5 Risk factors contributing to stroke development

Risk factors are different variables that play an important role in the development of stroke. It is an attribute or exposure to some environmental hazard that leads the individual to have a greater likelihood of developing an illness [56]. In addition, the concept of risk factors may differ depending on whether we are looking for causes of disease or measures to prevent disease. In the following chapter the association between stroke and medication not taken as prescribed, using excessive salt at meal, eating diet high in fat, no involvement in a weight reduction program, no involvement in a regular exercise program, no follow-up physician or clinic, smoking, and high level of stress were investigated by using logistic regression analysis, conditional logistic regression model (with, and without interaction) of the risk factors. Table 12 gives an overview over the potential explanatory factors for stroke used in the study.

Table 12

List of potential explanatory factors for stroke used in study

Main topics of questionnaire	**Potential explanatory factors of stroke**	**Symbol ***
1. Usage of anti-hypertensive medication	1. medication not taken as prescribed	**Q16**
2. Diet restrictions	1. excessive use of salt 2. usage of high fat	**Q19** **Q21**
3. Weight reduction	1. no attendance of weight reduction program	**Q22**
4. Exercise program	1. no regular physical exercise	**Q23**
5. Follow-up health care	1. no regular follow-up care	**Q25**
6. Psychological stress level *Range:* *(0=no; 1=little; 2=sometimes; 3=strong; 4=very strong)*	1. criticism 2. loneliness 3. nervousness 4. paranoia 5. social phobia **H**igh **L**evel of **S**tress, if sum score >10	(Q30)** (Q31)** (Q32)** (Q33)** (Q34)** **HLS*** (sum score)
7. Smoking	current smoking (1 or more cigarettes/day)	**Q26***

*** HLS = High level of stress**

**** These single items made up the sum score "HLS" which is used as an explanatory variable in the conditional logistic regression model.**

8.5.1 Logistic regression analysis (crude odds ratio)

Logistic regression is used to analyze the relationship between multiple independent variables and dependent variable that is categorical. In addition, it transforms the probability of an event occurring into its odds, and shows the ratio probability of one event relative to the probability of a second event. Also, this test helps us to generate odds ratio that can be meaningfully interpreted, and therefore may promote better understanding of the underlying relationships of the variables [180, 181, 182]. The results of this analysis are not based on a conditional logistic regression model, but it depends on the crude odds ratio.

Basic potential risk factors for stroke development are shown in table 13. Logistic regression analysis was used to determine the risk factors, which contribute to the development of stroke. There are significant associations between stroke and medication not taken as prescribed (OR=7.13;95%CI 3.32-15.32), using excessive salt at meal (OR=6.21;95%CI 3.75-10.29), and eating diet high in fat (OR=4.66;95%CI 2.87-7.56). Also an association was found between stroke and no involvement in a weight reduction program (OR=4.97;95% CI 1.72-14.36), no involvement in a regular exercise program (OR=4.94;95%CI 2.80-8.73), irregular measurement of blood pressure (OR=3.14;95%CI 1.92-5.14), no follow-up physician or clinic (OR=3.03;95%CI 1.802-5.102), and smoking (OR=2.20;95% CI 1.33-3.62).

Table 13

Risk factors of stroke among hypertensive patients in Gaza Strip

Simple Logistic Regression analysis (Crude odds ratios)

Presence of risk factors			
	(NO) (Compliance) (1=reference)	(YES) (Non-compliance) OR	95% CI
Risk factors			
Anti-hypertensive medication			
Medication not taken as prescribed	1	7.133	(3.320-15.327)
Dietary restrictions of sodium and fat			
Using excessive salt at meals	1	6.217	(3.755-10.294)
Eating diet high in fat	1	4.661	(2.871-7.566)
Weight reduction			
No involvement in a weight reduction program	1	4.979	(1.726-14.365)
Exercise program			
No involvement in a regular program of exercise	1	4.947	(2.803-8.731)
Follow-up health care			
No follow-up physician or clinic	1	3.032	(1.802-5.102)
Smoking			
Smoking	1	2.200	(1.337-3.621)

Note: Table reports estimates with 95% confidence interval
OR = odds ratio
CI = confidence interval

8.5.2 Conditional logistic regression for 1:2 matched case-control data (considering interaction terms)

A conditional logistic regression analysis model was used to determine the risk factors, which contribute to the development of stroke. This model is an important analytical techniques, which used to determine how likely the observed response is with respect to all possible responses [175, 176]. The most essential step in using PROC PHREG is the variables representing cases and controls must be redefined or a new variable created [177]. In addition, a conditional logistic regression is used to investigate the relationship between an outcome and a set of prognostic factors in matched case-control studies. If there is only one case and one control, the matching is 1:m. The m:n matching refers to the situation in which there is a varying number of cases and controls in the matched sets. Conditional logistic regression model can be performed with the PHREG procedure by using the discrete logistic model and forming a stratum for each matched set. In addition, you need to create dummy survival times so that all the cases in matched set have the same event time value, and the corresponding controls are examined later times [183].

The results of the final conditional logistic regression model based upon the backward selection procedure are shown in (Table 14). Two potential risk factors as weight reduction and irregular follow-up health care were excluded from the conditional logistic regression model due to backward selection with a significance level for removing an explanatory variable from the model α=0.05. Therefore these two factors were not considered in the final

conditional logistic regression models with interaction (Table 14) and without interaction (Table 15).

In our model five variables were found to be significant risk factors for stroke:

1. Medication not taken as prescribed, OR=16.03;95%CI 2.81-91.61
2. Excessive usage of salt, OR=16,61, 95%CI 4.40-62.80 if level of stress is low;
3. Excessive usage of fat, OR=6.20;95%CI 2.23-16.56;
4. Smoking, OR=9.88, 95%CI 2.52-38.78, if level of stress is low;
5. High level of stress, OR=17.74, 95%CI 4.62-68.05, if not smoking and no excessive usage of salt;

Significant interaction was taken into account. As there are 2 significant interaction terms it is impossible to express the effect of excessive usage of salt, current smoking, and high levels of stress by means of one odds ratio per variable. Thus, the association between these explanatory variables and the response are described by various odds ratios depending on the variable value. It can be concluded that the association between smoking and stroke can only be detected in the model containing the interaction terms. Smoking (OR=9.88, 95%CI 2.52-38.78) is a significant risk factor only, if the level of stress is low. The effect of high level of stress on stroke is modified by two variables: 1. usage of salt and 2. smoking. A high level of stress is a risk factor for stroke in non-smoking and if salt is used rarely only. The same interaction term shows that high level of stress appears to be a protective factor (OR=0.10;95%CI 0.02-0.58) in smokers and excessive users of salt. Regular

exercise can be considered as a significant protective factor (OR=0.20; 95%CI 0.09-0.49) for stroke. Thus, our conclusions are mainly based on this model.

Table 14

Results of the multiple conditional logistic regression model based upon backward selection

Risk factors	β	SE	P-value	OR	95% CI
Medication not taken as prescribed	2.77462	0.88923	0.0018	16.03	2.81-91.61
Using excessive salt at meals	2.81029	0.67837	<.0001	16.61 1.76	4.40-62.80 if HLS=0 0.58-5.33 if HLS=1
Eating diet high in fat	1.82466	0.50122	0.0003	6.20	2.23-16.56
Involvement in a regular program of exercise	-1.58582	0.44690	0.0004	0.20	0.09-0.49
Smoking	2.29022	0.69779	0.0010	9.88 0.52	2.52-38.78 if HLS=0 0.14-1.99 if HLS=1
High level of stress (HLS)	2.87562	0.68601	<.0001	17.74 1.88 0.10	4.62- 68.05 if Q19=Q26=0 0.58- 6.05 if Q19=1, Q26=0 0.02-0.58 if Q19=Q26=1
Interaction between high level stress and using excessive salt in meal	-2.24391	0.85458	0.0086		
Interaction between high level stress and smoking	-2.93735	0.88694	0.0009		

Note: - Table reports estimates with 95% confidence interval

OR = odds ratio; CI = confidence interval

8.5.3 Conditional logistic regression for 1:2 matched case-control data (without interaction terms)

The results of a multiple conditional logistic regression model containing only the main effects and no interaction terms are shown in (Table 15). Significant risk factors for stroke were excessive usage of salt (OR=4.512), excessive usage of fat (OR=4.671), high level of stress (OR=2.779) and medication not taken as prescribed (OR=6.073). Regular physical exercise (OR=0.269) was found to be a protective factor. Smoking (OR=2.127) is not a significant risk factor for stroke, if regarded as main effect only.

Table 15

Multiple conditional logistic regression model containing only the main effects and no interaction terms

Risk factors	β	SE	P-value	OR	95% CI
Medication not taken as prescribed	1.80387	0.70263	0.0102	6.073	1.532-24.071
Using excessive salt in meal	1.50678	0.40114	0.0002	4.512	2.056- 9.905
Eating diet high in fat	1.54128	0.40876	0.0002	4.671	2.096-10.407
Involvement in a regular program of exercise	-1.31138	0.38561	0.0007	0.269	0.127-0.574
Smoking	0.75479	0.48591	0.1203	2.127	0.821- 5.513
High level of stress (HLS)	1.02225	0.33769	0.0025	2.779	1.434-5.388

Note: - Table reports estimates with 95% confidence interval
OR = odds ratio
CI = confidence interval

8.6 Analysis of variance of quality of life (QOL) among the case and control groups

Analysis of variance (ANOVA) is an appropriate technique for analyzing the effect of a group of independent variables on one dependent variable and used to examine differences among two or more groups by comparing the variability between and within the group. In our study, we concern about the testing mean differences among the case and control groups by F-ratio statistic. We calculated a quantity known as between groups variance, which is the variability of the group means around the grand mean of all the data. Also we calculated another quantity called within-groups variance, which is the variability of the scores within each group around its own mean. The ratio of between-groups variance and within-groups variance is known as the (F) ratio. The degree of freedom (DF) corresponding to between-groups variance, which is the numerator of the (F) ratio, is equal to $K-1$, where K is the number of groups. The degree of freedom corresponding to the denominator of the (F) ratio, which is the within-groups variance, is equal to $K \times (n-1)$, that is, the number of groups times the number of scores in each group minus one. In the case of obtaining F distribution value less than or equal the critical value, we can then reject the hypothesis of no difference ("null hypothesis"). The important point of ANOVA test is to run out the risk of making a type one error to conclude that there is effect, but in fact, it has no effect. In our analysis, the mean square is the sum of squares divided by the degree of freedom. For between-groups, it is the variation of the group means around the grand mean, while for within-groups it is the pooled estimate of the variation of the individual scores around their respective group means [149].

8.6.1 Age and Quality of life domains among the case and control groups by comparison of mean

The study population shows 57% of the subjects among the case and control groups were between the ages of 52-63 years. One way ANOVA, means, standard deviation, and 95%CI were used to compare differences of mean and relationship within different age groups and quality of life domains (physical, psychological, social, and environmental). Table 16 shows the quality of life domains (physical, psychological, social, and environmental domains) by comparison of means and age group. The mean quality of life of physical domain is 56.15 between the ages of (46-51) Compared with 60.19 between the ages of (52-57). In addition, the quality of life in psychological, social, and environmental domains is 55.77, 64.40, and 56.08 for the ages (52-57) compared with 60.67, 66.05, and 58.20 for the ages of (58-63). Global value among the QOL domains is quit similar, but we have some differences in the QOL domains. As we know the QOL is decreased with aging process, but in this study, we see some times contradictory result especially between the age group (52-57), and (58-63), also between the age group (40-45), and (58-63). It shows a direct relation between age and QOL as increasing age will lead to increase QOL. The best QOL among physical domain is between the ages of (40-45). This result is expected mainly in this study because normally physical heath decreased with aging process. In our society old people plays an important role in decision-making, and problem solving in comparison with young people. This explains the reason that the best QOL among psychological, and social domain is between the age group (58-63).

As shown in table 16, there is no perfect correlation between quality of life domains and age group among the case and control groups.

Table 16

Age and Quality of life domains among the case and control groups by comparison of mean

Age in years		WHOQOl physical domain	WHOQOL psychological domain	WHOQOL social domain	WHOQOL environmental domain	WHOQOL global Value
40-45	**Mean**	62.3016	60.6481	61.1111	56.5972	54.1667
	N	9	9	9	9	9
	SD	18.5672	26.3615	19.9826	15.5030	25.7694
46-51	**Mean**	56.1508	51.6975	62.1914	54.4560	57.8704
	N	54	54	54	54	54
	SD	18.1766	20.4047	18.1504	15.8719	22.6874
52-57	**Mean**	60.1935	55.7726	64.4097	56.0872	56.3802
	N	96	96	96	96	96
	SD	19.8205	20.9459	17.2901	19.2658	24.8015
58-63	**Mean**	60.5283	60.6771	66.0590	58.2031	62.1094
	N	96	96	96	96	96
	SD	21.1090	18.2855	19.1273	17.5800	20.5559
64-69	**Mean**	56.2169	55.8128	64.7119	56.2500	58.4877
	N	81	81	81	81	81
	SD	19.8188	19.8921	19.3322	17.1448	20.6181
Total	**Mean**	58.7372	56.6592	64.5089	56.4825	58.7054
	N	336	336	336	336	336
	SD	19.9136	20.1399	18.4745	17.6142	22.3297

8.6.2 Comparison of mean between QOL domains and age by using F- test

F-test is fundamentally the ratio of two independent variance estimates of the same population variance. The characteristic of F distribution is positively skewed, has no negative values, and has a median approximately equal to

one. The analysis of variance or ANOVA allows us to make an overall comparison that tells whether there is a significant difference between the means of the groups [149]. Table 17 shows an existence of variance between-groups sum squares (SSB) which estimate increases with the effect of the independent variable and within–groups sum of squares (SSW) which remains constant. The variances of mean square, F-value, and level of significance between and within groups indicate no significant effects between QOL domains and age as given evidence for physical domain (F 0.94, α 0.43), psychological domain (F 1.96, α 0.09), social domain (0.45, α 0.76), environmental domain (F 0.42, α 0.79) and global value (F 0.93, α 0.44). It is obvious that age (independent variable) has no real effect on the QOL (dependent variable).

Table 17

Comparison of mean between QOL domains and age by using (F) test (One-way ANOVA)

WHOQOL domains *age in years	Combination between and within group variance	Sum of square	Degree of freedom (DF)	Mean square	F	Significance
Physical domain	**Between-group**	1501.616	4	375.404	.946	.437
	Within-group	131343.227	331	396.807		
	Total	132844.843	335			
Psychological domain	**Between-group**	3155.852	4	788.963	1.968	.099
	Within-group	132725.380	331	400.983		
	Total	135881.231	335			
Social domain	**Between-group**	628.900	4	157.225	.458	.767
	Within-group	113709.518	331	343.533		
	Total	114338.418	335			
Environmental domain	**Between group**	525.466	4	131.366	.420	.794
	Within-group	103411.447	331	312.421		
	Total	103936.913	335			
Global value	**Between-group**	1858.276	4	464.569	.931	.446
	Within-group	165178.554	331	499.029		
	Total	167036.830	335			

8.6.3 Comparison of mean between QOL results in our study population to the German standard population

Table 18 shows the quality of life domains by age, sex, mean and standard deviation among the case and control groups. The mean quality of life in the case and control among males is better than females in all domains and age groups. This result suits our culture and society regarding females, because we are living in a conservative society with some private ethics, rules and moral. Also the physiological structure of females may affect their QOL such as menstruation, pregnancy, hormonal changes, breast-feeding, and menopause. In addition, this result is convenient with the general standard of German population (appendix 4), which shows that the QOL among male is better than females in all domains. The mean QOL in physical domain is 64.28, psychological domain 72.22, social domain 66.66, and 64.58 in environmental domain compared with 82.30 in physical domain, 75.28 in psychological domain, 73.17 in social domain, and 69.36 in environmental domain in the general standard of German population among males between the age of (40-45) years. Also our study shows the mean quality of life is 56.54 in physical domain, 59.02 in psychological domain, 64.08 in social domain, and 53.05 in environmental domain compared with 71.03 in physical domain, 70.65 in psychological domain, 68.77 in social domain, and 68.96 in environmental domain in the general standard of German population among females between the ages of (58-63) years. This result is expected because we are living in completely different situation such as instability of political situation, incursion, curfew unhealthy sewage system and environment, and over population. In general, overall quality of life and in all domains in our study is lower than in the German general population. The main reason of a

comparison of our study results with the German general population is due to unavailability of standardized Palestinian QOL.

Table 18
Comparison of mean between QOL results in our study population to general standard of German population

Age in years	Sex	Mean	physical domain	psychological domain	social domain	Environmental domain	Global value
40-45	**Male**	**Mean**	64.2857	72.2222	66.6667	64.5833	62.5000
		N	3	3	3	3	3
		SD	14.2857	26.7879	16.6667	14.4338	25.0000
	Female	**Mean**	61.3095	54.8611	58.3333	52.6042	50.0000
		N	6	6	6	6	6
		SD	21.5966	26.5383	22.3607	15.6146	27.3861
	Total	**Mean**	62.3016	60.6481	61.1111	56.5972	54.1667
		N	9	9	9	9	9
		SD	18.5672	26.3615	19.9826	15.5030	25.7694
46-51	**Male**	**Mean**	59.7619	56.5278	67.7778	55.8333	63.7500
		N	30	30	30	30	30
		SD	17.3432	20.7522	16.7717	16.2221	20.5920
	Female	**Mean**	51.6369	45.6597	55.2083	52.7344	50.5208
		N	24	24	24	24	24
		SD	18.5421	18.6533	17.6883	15.5927	23.4518
	Total	**Mean**	56.1508	51.6975	62.1914	54.4560	57.8704
		N	54	54	54	54	54
		SD	18.1766	20.4047	18.1504	15.8719	22.6874
52-57	**Male**	**Mean**	63.8655	62.7451	68.1373	61.5809	57.8431
		N	51	51	51	51	51
		SD	19.2280	18.7345	15.8733	19.0834	24.1040
	Female	**Mean**	56.0317	47.8704	60.1852	49.8611	54.7222
		N	45	45	45	45	45
		SD	19.8677	20.6931	18.0215	17.6897	25.7403
	Total	**Mean**	60.1935	55.7726	64.4097	56.0872	56.3802
		N	96	96	96	96	96
		SD	19.8205	20.9459	17.2901	19.2658	24.8015
58-63	**Male**	**Mean**	63.6243	61.9599	67.5926	62.2106	65.0463
		N	54	54	54	54	54
		SD	21.9399	20.1385	20.0671	17.9802	21.0821
	Female	**Mean**	56.5476	59.0278	64.0873	53.0506	58.3333
		N	42	42	42	42	42
		SD	19.5284	15.6693	17.8908	15.8067	19.4565
	Total	**Mean**	60.5283	60.6771	66.0590	58.2031	62.1094
		N	96	96	96	96	96
		SD	21.1090	18.2855	19.1273	17.5800	20.5559
64-69	**Male**	**Mean**	58.5317	60.3009	69.4444	59.2014	63.5417
		N	36	36	36	36	36
		SD	17.6473	20.5694	19.4161	17.5818	18.7500
	Female	**Mean**	54.3651	52.2222	60.9259	53.8889	54.4444
		N	45	45	45	45	45
		SD	21.4135	18.7941	18.6188	16.6050	21.3460
	Total	**Mean**	56.2169	55.8128	64.7119	56.2500	58.4877
		N	81	81	81	81	81
		SD	19.8188	19.8921	19.3322	17.1448	20.6181
Total	**Male**	**Mean**	61.9869	61.0872	68.1513	60.3448	62. 3563
		N	174	174	174	174	174
		SD	19.3758	19.9675	17.9813	17.8607	21.5037
	Female	**Mean**	55.2469	51.9033	60.5967	52.3341	54.7840
		N	162	162	162	162	162
		SD	19.9512	19.2773	18.2485	16.4119	22.5997
	Total	**Mean**	58.7372	56.6592	64.5089	56.4825	58.7054
		N	336	336	336	336	336
		SD	19.9136	20.1399	18.4745	17.6142	22.3297

8.6.4 Mean quality of life domains among case and control groups by diagnosis

Table 19 shows the quality of life domains by diagnoses, mean and standard deviation among the case and control group. The mean quality of life in physical domain is 41.2628, psychological domain 40.4762, social domain 51.0417, and environmental domain is 46.0379 among the case group. In comparison to the cases, in the control group 67.4745 in physical domain, 64.7507 in psychological domain, 71.2426 in social domain, and 61.7048 in environmental domain. Overall, mean quality of life domains among the case group is less than the control group. The best QOL is among social domain in both groups, because we are living in a well-related society, and the person feels obliged to relate with others.

Table 19

Mean quality of life domains among the case and control group by diagnosis

Diagnosis	Mean	Physical domain	Psychological domain	Social domain	Environmental domain	Global value
Case	**Mean**	41.2628	40.4762	51.0417	46.0379	45.2009
	N	112	112	112	112	112
	SD	15.4960	15.3111	17.3697	17.4118	23.1431
control	**Mean**	67.4745	64.7507	71.2426	61.7048	65.4576
	N	224	224	224	224	224
	SD	15.6891	17.1856	15.0305	15.2642	18.5756
Total	**Mean**	58.7372	56.6592	64.5089	56.4825	58.7054
	N	336	336	336	336	336
	SD	19.9136	20.1399	18.4745	17.6142	22.3297

8.6.5 The mean quality of life domains among the case and control groups by diagnosis, and age group

Table 20 shows the means quality of life domains by diagnosis, age groups, and standard deviation among the case and control groups. The mean quality of life in physical domain is 45.23, psychological domain 34.72, social domain 38.88, and environmental domain is 43.75 among the case group between the ages of (40-45) years. In comparison to the cases, in the control group 70.83 in physical domain, 73.611 in psychological domain, 72.22 in social domain, and 63.02 in environmental domain at the same age group. The mean quality of life among the case group is 36.64 in physical domain, 40.12 in psychological domain, 50.92 in social domain, and 44.56 in environmental domain between the ages of (64-69). In comparison to the cases, in the control group 66.005 in physical domain, 63.65 in psychological domain, 71.60 in social domain, and 62.09 in environmental domain at the same age group. Also the total quality of life mean among the case group at all ages is 41.26 in physical domain, 40.47 in psychological domain, 51.04 in social domain, and 46.03 in environmental domain. In comparison to the cases, in the control group 67.47 in physical domain, 64.75 in psychological domain, 71.24 in social domain, and 61.70 in environmental domain at all age groups. Overall, mean quality of life domains among the case group is less than the control group at all ages. As we see, commitment to the therapeutic regimen among the control group made a better QOL in comparison with the case group who were less compliant.

Table 20

Mean quality of life domains by diagnosis, and age group

Diagnosis	Age in years	Mean	Physical domain	Psychological domain	Social domain	Environmental domain	Global value
Case	40-45	Mean	45.2381	34.7222	38.8889	43.7500	25.0000
		N	3	3	3	3	3
		SD	5.4554	12.0281	19.2450	19.0086	21.6506
	46-51	Mean	42.6587	34.4907	48.1481	45.4861	45.1389
		N	18	18	18	18	18
		SD	13.1064	15.1790	15.2741	13.1373	25.0510
	52-57	Mean	43.8616	38.9323	53.9062	47.0703	41.4063
		N	32	32	32	32	32
		SD	16.7818	13.8237	14.8143	19.3932	24.2711
	58-63	Mean	41.4063	46.2240	51.0417	46.7773	47.6562
		N	32	32	32	32	32
		SD	17.9344	14.8680	18.5435	17.3809	20.4381
	64-69	Mean	36.6402	40.1235	50.9259	44.5602	49.0741
		N	27	27	27	27	27
		SD	12.5526	16.5923	20.0604	18.4388	23.4946
	Total	Mean	41.2628	40.4762	51.0417	46.0379	45.2009
		N	112	112	112	112	112
		SD	15.4960	15.3111	17.3697	17.4118	23.1431
Control	40-45	Mean	70.8333	73.6111	72.2222	63.0208	68.7500
		N	6	6	6	6	6
		SD	16.6624	21.1914	6.8041	9.5641	10.4583
	46-51	Mean	62.8968	60.3009	69.2130	58.9410	64.2361
		N	36	36	36	36	36
		SD	16.6265	17.0342	15.2778	15.3485	18.6970
	52-57	Mean	68.3594	64.1927	69.6615	60.5957	63.8672
		N	64	64	64	64	64
		SD	15.8302	18.7477	16.0856	17.6831	21.6067
	58-63	Mean	70.0893	67.9036	73.5677	63.9160	69.3359
		N	64	64	64	64	64
		SD	15.3316	15.3709	14.5141	14.7622	16.5066
	64-69	Mean	66.0053	63.6574	71.6049	62.0949	63.1944
		N	54	54	54	54	54
		SD	14.9241	16.5566	14.8824	13.1332	17.4116
	Total	Mean	67.4745	64.7507	71.2426	61.7048	65.4576
		N	224	224	224	224	224
		SD	15.6891	17.1856	15.0305	15.2642	18.5756
Total	40-45	Mean	62.3016	60.6481	61.1111	56.5972	54.1667
		N	9	9	9	9	9
		SD	18.5672	26.3615	19.9826	15.5030	25.7694
	46-51	Mean	56.1508	51.6975	62.1914	54.4560	57.8704
		N	54	54	54	54	54
		SD	18.1766	20.4047	18.1504	15.8719	22.6874
	52-57	Mean	60.1935	55.7726	64.4097	56.0872	56.3802
		N	96	96	96	96	96
		SD	19.8205	20.9459	17.2901	19.2658	24.8015
	58-63	Mean	60.5283	60.6771	66.0590	58.2031	62.1094
		N	96	96	96	96	96
		SD	21.1090	18.2855	19.1273	17.5800	20.5559
	64-69	Mean	56.2169	55.8128	64.7119	56.2500	58.4877
		N	81	81	81	81	81
		SD	19.8188	19.8921	19.3322	17.1448	20.6181
	Total	Mean	58.7372	56.6592	64.5089	56.4825	58.7054
		N	336	336	336	336	336
		SD	19.9136	20.1399	18.4745	17.6142	22.3297

8.6.6 Comparison of QOL domains and diagnosis by using (F) test

Table 21 shows an existence of variance between-groups sum squares (SSB) which estimates increases with the effect of the independent variable and within–groups sum of squares (SSW) which remains constant. The variances of mean square, F-value, and level of significance between and within group indicate a significant effect between QOL domains and diagnosis as evidence is given by physical domain (F 210.12, α .000), psychological domain (F 159.93, α .000), social domain (F 121.34, α .000), environmental domain (F 71.50, α .000) and global value (F 75.02, α .000). It is obvious that diagnosis (independent variable) has had a real effect on the QOL (dependent variable) and SSB is really an estimation of the same population variance (sigma) plus the effects of the independent variable, while SSW is just an estimate of the same population variance (sigma). We can immediately conclude a rejection of null hypothesis, which indicates no effect.

Table 21

Comparison of QOL domains and diagnosis by using (F) test

(One-way ANOVA)

WHOQOL domains *diagnosis	Combination between and within group variance	Sum of square	Degree of freedom (DF)	Mean square	F	Significance
Physical domain	**Between-group**	51300.109	1	51300.109	210.121	.000
	Within-group	81544.734	334	244.146		
	Total	132844.84	335			
Psychological domain	**Between-group**	43997.628	1	43997.628	159.933	.000
	Within-group	91883.603	334	275.101		
	Total	135881.23	335			
Social domain	**Between-group**	30469.680	1	30469.680	121.343	.000
	Within-group	83868.738	334	251.104		
	Total	14338.42	335			
Environmental domain	**Between group**	18326.954	1	18326.954	71.501	.000
	Within-group	85609.959	334	256.317		
	Total	103936.91	335			
Global value	**Between-group**	30638.253	1	30638.253	75.024	.000
	Within-group	136398.58	334	408.379		
	Total	167036.83	335			

Level of significance = .05

8.6.7 The mean quality of life domains among the case and control groups by sex

Table 22 shows that the mean quality of life in physical domain is 44.3350, psychological domain 42.2414, social domain 54.3103, and environmental domain is 49.7845 among the males in the case group. In comparison to the male cases, in the control group 70.8128 in physical domain, 70.5101 in psychological domain, 75.0718 in social domain, and 65.6250 in environmental domain. The mean quality of life in physical domain is 37.9630, psychological domain 38.5802, social domain 47.5309, and environmental domain is 42.0139 among females in the case group. In comparison to female cases, in the control group 63.8889 in physical domain, 58.5648 in psychological domain, 67.1296 in social domain, and 57.4942 in environmental domain. In addition, the total quality of life means among males in the case and control group at all domains is higher than the total quality of life means among females in both groups. Overall, mean quality of life in males and females among the case group is less than the control group in both sexes at all domains. Families in Gaza Strip are extended, so at least each married woman has six or seven children. Culturally our society is a conservative society, and normally women are staying at home working, looking for children, cooking, washing, ironing, and looking for her husband. All of that will lead to over stress or pressure, which in turn leads to less QOL in comparison to men. On the other hand female patients among the control group not only do better than female patients among the case group, but also are doing better than males, and this is due to more compliance to the therapeutic regimen among the control group. The best QOL in the case and

control group and in both sexes is among social domain and this is convenient with our society in the way of respecting the old people.

Table 22

Mean quality of life domains among the case and control groups by sex

Diagnosis	Sex	Mean	Physical domain	Psychological domain	Social domain	Environmental domain	Global value
Case	**Male**	**Mean**	44.3350	42.2414	54.3103	49.7845	48.9224
		N	58	58	58	58	58
		SD	16.9643	16.4542	17.1879	17.8115	22.7357
	Female	**Mean**	37.9630	38.5802	47.5309	42.0139	41.2037
		N	54	54	54	54	54
		SD	13.1139	13.8828	17.0267	16.1830	23.1165
	Total	**Mean**	41.2628	40.4762	51.0417	46.0379	45.2009
		N	112	112	112	112	112
		SD	15.4960	15.3111	17.3697	17.4118	23.1431
Control	**Male**	**Mean**	70.8128	70.5101	75.0718	65.6250	69.0733
		N	116	116	116	116	116
		SD	13.6527	14.0323	13.9658	15.4364	17.4036
	Female	**Mean**	63.8889	58.5648	67.1296	57.4942	61.5741
		N	108	108	108	108	108
		SD	16.9589	18.1472	15.1075	13.9620	19.0841
	Total	**Mean**	67.4745	64.7507	71.2426	61.7048	65.4576
		N	224	224	224	224	224
		SD	15.6891	17.1856	15.0305	15.2642	18.5756
Total	**Male**	**Mean**	61.9869	61.0872	68.1513	60.3448	62.3563
		N	174	174	174	174	174
		SD	19.3758	19.9675	17.9813	17.8607	21.5037
	Female	**Mean**	55.2469	51.9033	60.5967	52.3341	54.7840
		N	162	162	162	162	162
		SD	19.9512	19.2773	18.2485	16.4119	22.5997
	Total	**Mean**	58.7372	56.6592	64.5089	56.4825	58.7054
		N	336	336	336	336	336
		SD	19.9136	20.1399	18.4745	17.6142	22.3297

8.6.8 Comparison of QOL domains and sex by using (F) test

Table 23 shows an existence of variance between-groups sum squares (SSB) which estimates increases with the effect of the independent variable and within–groups sum of squares (SSW) which remains constant. The variances of mean square, F value, and level of significance between and within group indicate a significant effect between QOL domains and sex as evidence by physical domain (F 9.86, α .002), psychological domain (F 18.34, α .000), social domain (14.59, α .000), environmental domain (F18.24, α .000) and global value (F 9.904, α .002). It is obvious that sex (independent variable) has had a real effect on the QOL (dependent variable) and SSB is really an estimation of the same population variance (sigma) plus the effects of the independent variable, while SSW is just an estimate of the same population variance (sigma). We can immediately conclude a rejection of null hypothesis, which indicate no effect.

Table 23

Comparison of QOL domains and sex by using (F) test

(0ne-way ANOVA)

WHOQOL domains *sex	Combination between and within group variance	Sum of square	Degree of freedom (DF)	Mean square	F	Significance
Physical domain	**Between-group**	3810.995	1	51300.109	9.865	.002
	Within-group	129033.85	334	244.146		
	Total	132844.84	335			
Psychological domain	**Between-group**	7075.818	1	43997.628	18.348	.000
	Within-group	128805.41	334	275.101		
	Total	135881.23	335			
Social domain	**Between-group**	4787.974	1	30469.680	14.598	.000
	Within-group	109550.44	334	251.104		
	Total	114338.42	335			
Environmental domain	**Between group**	5383.545	1	18326.954	18.245	.000
	Within-group	98553,368	334	256.317		
	Total	103936.91	335			
Global value	**Between-group**	30638.253	1	30638.253	9.904	.002
	Within-group	136398.58	334	408.379		
	Total	167036.83	335			

Chapter 9

Discussion

The foregoing discussion highlights the importance of compliance with the therapeutic regimen in the management of hypertension, and prevention of stroke and reduction of the incidence of stroke. As illustrated in our present research work, the case-control study has indicated a relation between non-compliance with the therapeutic regimen and development of stroke.

9.1 Non-compliance with the therapeutic regimen and development of stroke

In our case-control study, we found evidence of non-compliance with the therapeutic regimen (anti-hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, follow-up health care and smoking) and development of stroke by logistic regression analysis, and percentages and frequency distributions as shown in table 10 and 13. The results of the study were similar to other studies and previous literature reviews, which have reported that the treatment of hypertension is started nowadays with non-pharmacological therapy through a modification of lifestyle such as weight reduction, increase physical activity, moderation of dietary sodium and fat, limited alcohol intake and avoidance of stress [66]. In addition, non-compliance with the therapeutic regimen such as anti-hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, and smoking is usually the main cause of hypertensive complications, mainly stroke [67]. Bronner et al., and Gorelick et al. show that modification of risk factors is known to decrease the incidence of

stroke in asymptomatic people [197, 198] Also Krause and Mahanl show the proper and successful management of hypertension is going through three steps, which are anti-hypertensive medication, sodium restriction, and weight reduction [68]. Other studies regarding anti-hypertensive medication show that the treatment of moderate and severe hypertension by anti-hypertensive medication reduces hypertensive complications in general, and stroke mortality by 50% [69]. MacWalter et al. reported that anti-hypertensive agents have been clearly shown to prevent both cerebral hemorrhage and cerebral infarctions [29]. On the other hand the WHO states that the prevention of stroke by anti-hypertensive therapy has been successful, but more research is required to evaluate the effectiveness of anti-hypertensive therapy and life style modification in preventing previous types of stroke and recurrent stroke [12]. In this regard, our results revealed that patients who developed stroke were less likely to be compliant with the therapeutic regimen than the hypertensive patients who did not develop stroke.

9.2 Risk factors which contribute to stroke development

To determine the risk factors which contribute to the development of stroke, simple logistic regression models, multiple conditional logistic regression model considering main effects only (no interactions), and multiple conditional logistic regression model based upon backward selection were used.

9.2.1 Logistic regression analysis

In the simple logistic regression analysis we found significant associations between stroke and medications not taken as prescribed (OR=7.13;95%CI 3.32-15.32), using excessive salt in meals (OR=6.21;95%CI 3.75-10.29),

eating diet high in fat (OR=4.66;95%CI 2.87-7.56), no involvement of weight reduction program (OR=4.97;95%CI 1.72-14.36), no involvement in a regular program of exercise (OR=4.94;95%CI 2.80-8.73) no follow-up physician (OR=3.03;95%CI 1.80-5.10), and smoking (OR=2.20;95%CI 1.33-3.62). The results of this study are matched with other studies in some findings and differed in others. These results support previous studies, which have reported direct evidence for obesity [32], inactivity [33] and development of stroke. Collins and MacMahon have reported that 5-6 mmHg mean decline in diastolic blood pressure for 5 years led to 38% to 42% reductions in stroke incidence respectively [150, 151]. In addition, anti-hypertensive medication is very important in controlling blood pressure, and it was shown to be significant in decreasing the mortality rate of hypertensive complications such as stroke [45].

Recent surveys have shown fewer than 30% of hypertensive patients benefit from treatment, because of non-compliance with medical advice, despite convincing evidence that anti-hypertensive medication prevents premature death and suffering from such devastating complications as stroke and heart attack [73]. Several studies reported that physical activity decreases the risk for thromboembolic stroke among older non-smokers, and it reduces the risk of cerebral haemorrhage [76, 77, 78]. Dishman says in the book “Advances in exercise adherence" that Salonen et al. reported a statistical significant association between low physical activity and cerebral stroke [79]. Abbott et al. showed that inactive or partially active old people experienced three to four fold excess incidence of haemorrhagic stroke in comparison with active old

people ($p < 0.01$) [33]. On the other hand, Kiely and Wolf indicated medium and high levels of physical activity among men are protective against stroke, relative to low levels [35]. Another study showed regular physical activity may be of benefit in preventing stroke in women as well as in men [83]. The WHO stated an important relationship between types of diet and developing chronic diseases, such as cerebrovascular disease, and emphasize that hypertension is considered as the main risk factor of stroke in developing countries with other contributory factors such as increase salt intake, obesity and alcohol intake [14]. The Framingham Heart study showed that smoking is a significant and independent risk factor for stroke in general, and brain infarction in particular [102]. In addition, cohort studies have shown that cigarette smoking is an independent risk factor for ischemic stroke in both men [195], and women [196]. Another study shows, current but not former cigarette smoking is to be significantly associated with an increased risk for stroke in men [109]. In addition, other studies reported that a compliance with follow-up treatment guidelines for hypertension could significantly reduce the risk of stroke [152, 153]. On the other hand, O'Brien et al. showed that the evidence of anti-hypertensive treatment in the prevention of stroke is less clear [18].

A WHO expert committee (1996) reported that more studies are required to evaluate the effectiveness of anti-hypertensive medication in preventing different types of stroke [12]. The inconsistency of these results may be due to inappropriate sample size, and lack of controlling of confounding variables. In our investigation, we considered the limitations of other studies in order to

control the confounding variables. We utilized all patients who were hospitalized during the year of 2001 with stroke and history of hypertension only, and they were compliant with the therapeutic regimen more than one year.

9.2.2 Multiple conditional logistic regression model considering main effects only (no interactions)

In this model we found an association between involvement in regular program of exercise and development of stroke (OR=0.269; 95%CI 0.127-0.574) which appeared to be protective. This result is different from the simple logistic regression analysis, but matches with other studies that show medium and high levels of physical activity among men are protective against stroke, relative to low levels [35]. Also regular physical activity may be of benefit in preventing stroke in women as well as in men [83].

We also found no significant association between smoking and development of stroke (OR=2.127; 95%CI 0.821-5.513). This result is different from the simple logistic regression analysis, which indicates a significant association between smoking and development of stroke (OR=2.200; 95%CI 1.337-3.621). In addition, Donnan et al. found in a case-control study an odds ratio of 5.2 for smokers compared to non-smokers for the presence of transient ischemic attack [154]. Furthermore, we found a significant association between high level stress (HLS) and development of stroke (OR=2.779; 95%CI 1.434-5.388). This result matches with previous literature reviews, which have reported that the treatment of hypertension is started today with

non-pharmacological therapy through a modification of lifestyle, which includes a reduction or avoidance of stress [66]. On the other hand, this result is different from the literature, where little medical evidence is reported that stress causes stroke; and most strokes occur in people who are not under great stress [1]. Also Isaacs stated that some stroke patients and their families think their illness was caused by stress, strain, and emotion such as anger. At the same time, many people live with stress, but mercifully, these do not end in strokes [2].

9.2.3 Multiple conditional logistic regression model considering interaction terms

The results of this model showed a significant association between using excessive salt in meals and development of stroke with low level of stress (OR=16.61; 95%CI 4.40-62.80), but this association was completely not significant with high level of stress (HLS) (OR=1.76; 95%CI 0.58-5.33). This indicates that using excessive salt in meals is a significant risk factor for stroke in interaction with low level of stress only. Table 14 shows a protective factor between regular physical exercise and development of stroke (OR=0.20; 95%CI 0.09-0.49). This result is similar to the multiple conditional logistic regression model considering main effects only without interaction (OR=0.269; 95%CI 0.127-0.574). Also smoking is a significant risk factor for stroke (OR=9.88; 95%CI 2.52-38.78) with low level of stress. In contrast to this, smoking is a non-significant protective factor with HLS (OR=0.52; 95%CI 0.14-1.99). This result is different from the multiple conditional logistic regression model considering main effects only (no interactions), which shows

no statistical significant association between smoking and development of stroke (OR=2.127; 95%CI 0.821-5.513). High level of stress is a significant risk factor for stroke development (OR=17.74; 95%CI 4.62-68.05) and this is a similar result to the multiple conditional logistic regression model considering main effects only without interactions (OR=2.779; 95%CI 1.434-5.388). In addition, the interaction between smoking and HLS turns out to be a protective factor for stroke (OR=0.10; 95%CI 0.02-0.58). This indicates that smokers may benefit from cigarettes in stressful situations. There is also no significant association between stroke and the interaction term of HLS and excessive using of salt (OR=1.88; 95%CI 0.58-6.05).

9.3 Differences in quality of life among the case and control groups.

9.3.1 Differences in quality of life using descriptive statistics

Figure 15 shows approximately half of the study population (54%) rating their quality of life as good and very good among the control group compared with 41% of the case group. More compliance with the therapeutic regimen (anti-hypertensive medication, dietary restrictions of sodium and fat, weight reduction, exercise program, follow-up health care and smoking) among the control group made their quality of life better in comparison to the case group. The results of this study compared with other studies show that there was some evidence for beneficial effects of antihypertensive drugs on quality of life [155]. On the other hand, analysis of interview questionnaires and reports of dropouts and side effects rates of anti-hypertensive medication among elderly people show that there are no significant negative effects on quality of life [156, 157, 190]. At the same time, another study shows that the treatment of

systolic hypertension has positive impact on improving the quality of life among older aged people [192]. In addition, another study shows that active treatment of the systolic hypertension trial in Europe was associated with some adverse impacts on quality of life [191], and hypertensive patients receiving antihypertensive medication have more symptoms and lower health related quality of life. Differences were detected by both a brief, general health related quality of life instrument and a detailed, disease-specific instrument [193]. Figure 16 shows approximately two third of the study population were satisfied or very satisfied with the state of health among the control group compared with one fourth among the case group. The high percentage of satisfaction with the health status among the control group is due to more commitment to the therapeutic regimen in comparison to the case group. On the other hand, may be the low income and poverty explains the low satisfaction rate among the case group. This result matches with the Palestinian Red Crescent Society report, which shows that the unemployment rate in the West Bank and Gaza Strip is estimated to 53%, and the percentage of Palestinians living below the poverty line to 64%. In contrast, 21.1% of the population was below the poverty line prior to the outbreak of the Intifida in September 2000 [194]. In addition Raphael D, 2003 said that “one of the greatest determinants of health is income. In other words, if you are poor, you are more likely to have heart disease." Also Sandeman G, 2003 said that "we need to understand that health care is not only about building hospitals and hiring doctors. If we can reduce poverty, we can reduce ill health" [199], and if the country as a whole was more wealthy then there ought to less poverty [200]. Figure No. (17) shows approximately two third of the study

population among the control group were not at all or a little had pain which impaired the ADL compared to about one fourth among the case group. In addition, approximately two third of the study population among the case group were very much and extremely had pain impaired the ADL compared to one fourth among the control group. This variation between the case and control group is due to a higher compliance rate at taking the medication as prescribed and at proper time among the control group. Figure No. (18) shows that two third of the study population among the case group are very much and extremely in need for medical treatment to manage their daily life compared with the control group 27%. There were no big differences in the way of enjoying life among the case and control group. This could be due to political reasons and some circumstances such as incursion, curfew, closure, assassination, demolition of houses, and destruction of infrastructure as shown in figure No. (19). The society looks to the chronic disease patients as disabled persons, which affect the way the patients feel about their existence and values. In comparison to the control group the majority of the cases as shown in figure No. (20) feel that their life is unmeaning in a way or another and this is due to the extent of perceiving and coping with the chronic disease. Figure No. (21) shows approximately half of the control group has very much and extremely the ability to work with concentration and this could be due to low negative feelings such as depression and despair as shown in figure 40 than the case group. This result matched with another study, which showed that depressed stroke patients experienced more impairment of concentration and memory function than non-depressed stroke patients [158]. The low percentage of working with concentration among the control group could be

due to the adverse reaction of antihypertensive drugs such as dizziness and fatigue. This result matched with other literature review, which showed antihypertensive drugs are often blamed for numerous nonspecific symptoms, such as fatigue, dizziness, and sexual function, and drugs to lower blood pressure are commonly believed to reduce quality of life [159]. There are no big differences in both groups regarding feeling of safety in their daily life as shown in figure No. (22). The main reason of that could be physical or emotional trauma that most people face in Gaza Strip due to unstable political situation. As we see in figure No. (23) a considerable amount of patients in both groups felt their physical environment is unhealthy. This could be due to high-density rate of population in Gaza Strip. Also air pollution, noise pollution, crowded houses, bad ventilation and unhealthy sewage system make the problem of physical environment more worse. On the other hand, many people in Gaza Strip are living in urban area, which make a good amount of patients in both groups have a better physical environment. In addition, the location and residency of patients (urban or rural) affect the health in their physical environment. Approximately one-third among the case group were not at all had enough energy for every day life in comparison to 3% of the control group as shown in figure No. (24). This difference between the two groups is due to the way the patient cope with chronic disease, because each human being is mentally, socially, and physically unique. Figure No. (25) shows a high rate of accepting body appearance. Religious background such as faith and destiny is the main cause of this issue between both groups. This result matches with other studies, which found a significant relation between religious attendance, religious feelings, and health [160, 161]. The economical

status in Gaza Strip is very bad especially during uprising. The result of figure No. (26) shows that the majority of the control group and about half of the case group did not face any serious economical problem in meeting their needs. This result does not reflect the bad economical status in Gaza, but the aids of the international community substituted the low-income rate by providing the basic needs for the people such as (flour, rice, sugar, and oil). As shown in figure No. (27) the high rate of the available information that the patients need in their daily life does not reflect a high level of health education standard in our society, but because our society is considered to be socially attached and patients in both groups could get information from relative or neighboring health professional personnel. Figure No. (28) shows two third among the control group had moderately, mostly, and completely the opportunity of leisure activities in comparison to about one third among the case group. High compliance rate with the therapeutic regimen among the control group in comparison to the case group gave them the opportunity and the motivation to enjoying some leisure activities. Figure No. (29) shows approximately more than two third among the control group and one-third among the case group were good and very good of the ability of getting around. This high rate of getting around does not reflect good and very good state of health and QOL in both groups, but old people in our society play a major role in decision making regarding social occasion like wedding, funerals, and problem solving even the patients were sick they felt socially obliged to participate in such occasions. Approximately More than 80% of the control group and 50% of the case group were satisfied and very satisfied with their sleeping pattern as shown in figure No. (30). This high rate of sleeping

satisfaction between both groups does not reflect the state of health, safely environment, and very good QOL, but Faith and dependence on God play major role. Also more compliance with the therapeutic regimen among the control group made some differences with the case group regarding sleeping satisfaction. Figure No. (31) shows 78% were completely satisfied with their performance of daily life activities in comparison with 46% among the case group. Differences between the two groups might be due to the high rate of depression 91% among the case group as shown in figure No. (40). This result is not surprising because depression has been associated with poorer physical function [162]. Figure No. (32) shows approximately more than two third 71% of the control group were satisfied with their capacity for work. This high rate of satisfaction is related to the absence or a little of physical pain which influence patients activity of daily living as shown in figure No. (17), and made it better for their capability of performing their jobs. Also about one third of the case group was satisfied with their capacity for work, this low rate of satisfaction is due to inability to concentrate as 41% of the case group was unable to concentrate properly which negatively affected their capacity of work as shown in figure No. (21). Figure No. (33) shows that 88% of the control group were completely satisfied with their self in comparison with 56% of the case group. The difference between the two groups is due to the way individual accept, cope and live with the disease. Figure No. (34) shows a high rate of satisfaction with personal relationships among the case and control group because we are living in a well-related society and the patients feel obliged to relate with others. Nevertheless, we still see a small rate of unsatisfied patients; this might be due to personality characteristic such as

loneliness, isolation, and depression. Approximately about half of the study population was satisfied with their sex life among the control group compared with one third among the case group as shown in figure No. (35). We see unexpected results because the hypertensive patients in Gaza Strip have an idea that antihypertensive drugs cause sexual impairment, but in fact, some antihypertensive drugs may cause impotence as undesired side effect. In figure No. (35), we expected the case group who were less compliant to antihypertensive drugs to be more satisfied with their sexual life, but the study showed 28% of the case group subjects were satisfied with their sexual life. Meanwhile the subjects in the control group who were more compliant to antihypertensive drugs had a better satisfaction rate of sexual life. This result differed from other literature review, which showed antihypertensive drugs are often blamed for numerous nonspecific symptoms, such as fatigue, dizziness, and sexual function, and drugs to lower blood pressure are commonly believed to reduce quality of life [159]. The results of this scientific study motivate us to build a health education program at secondary and tertiary health prevention about how compliance to the therapeutic regimen is helpful to improve patient's quality and sex life. Figure No. (36) shows that 91% of the control group were satisfied with the support of their friends, because friendship relations are very strong among all society sectors. On the other hand, about 51% of the case group were unsatisfied with the support of their friends. This is due to the state of depression they feel as shown in figure No. (40). Non-acceptance of the disease, low self-esteem, feeling isolated, and despair are other reasons. This result is matched with other studies, which showed that lack of social support has been associated with increased

mortality risk [163] and delayed recovery from disease [164]. Considerable amounts of the case and control group are satisfied with the conditions of their living place as shown in figure No. (37). This result was unexpected, but people in both groups are trying to accept the conditions of their living place, because they are unable to change, and they have to cope and modify their life to meet their needs. Figure No. (38) shows that 41% of the case group was unsatisfied with their access to health services, but this does not mean that these people did not get an access to health services, but it means that they faced many difficulties such as closure, and incursion. The mean problem is not the access of health services, but the problem is, whether these patients receiving a good quality of care or not because of the high number of patients compared with low number of physicians and health providers. Figure No. (39) shows 56% of the case group had some difficulties might made them feel unsatisfied for example they did not have private cars, and they had to walk some distances to reach the transport station. Some people had very bad financial situation made them unable to afford transport fees. As shown in figure No. (40), ninety-one percent of the case group had the negative feeling of blue mood, despair, anxiety, and depression compared with 26% among the control group. This gave us a clue to why they had low QOL rate, because as we know depressed stroke patients experienced more impairment of concentration and memory function than non-depressed stroke patients [158]. Also this result is not surprising because depressive symptoms have been reported to be associated with many medical conditions [165].

9.3.2 Differences in quality of life by ANOVA and F-test

Table 16 shows the global value among the QOL domains is quite similar, but we have some differences in QOL domains. The best QOL is among psychological and social domains in general between the ages group (58-63), because in our society old people play an important role in decision-making, and problem solving in comparison with young people. In general, there is no perfect correlation between quality of life domains and age group. Also table 17 shows the variances of mean square, F value, and level of significance between and within group indicate no significant effect between QOL domains and age as evidence by physical domain (F 0.94, α 0.43), psychological domain (F 1.96, α 0.09), social domain (F 0.45, α 0.76), and environmental domain (F 0.42, α 0.79). It is obvious that age (independent variable) has no real effect on the QOL (dependent variable). Meanwhile table 18 shows the mean quality of life in the case and control groups among males is better than females in all domains and age groups. This result is expected because we are living in a conservative society, and physiological structure of females may affect their QOL such as menstruation, and menopause [184, 185, 186]. In addition, quality of life and in all domains in our study is lower than in the German general population due to unsafely, less quality and quantity of water, inadequate food hygiene, and municipal services [10]. Table 19 and 20 show that the overall mean quality of life domains among the case group is less than in the control group regarding diagnosis and age group. More commitment with the therapeutic regimen among the control group made a better QOL in comparison with the case group who were less compliant. Table 21 shows the variances of mean square, F value, and level of

significance between and within group indicate a significant effect between QOL domains and diagnosis as evidence by physical domain (F 210.12, α .000), psychological domain (F 159.93, α .000), social domain (F 121.34, α .000), and environmental domain (F 71.50, α .000). It is obvious that the diagnosis (independent variable) has had a real effect on the QOL (dependent variable). This provides evidence that patients who developed stroke had less QOL than the hypertensive patients who did not develop stroke. Table 22 shows the mean quality of life among males in the case and control groups at all domains is higher than the total quality of life mean among females in both groups. In my point of view, we are living in extended family, and normally women are staying at home working, and looking after children, that may lead to over pressure that in turn leads to less QOL in comparison to males who have more freedom. Overall, mean quality of life in males and females among the control group is higher than the case group due to more compliance rate with the therapeutic regimen. Table 23 shows the variances of mean square, F value, and level of significance between and within group indicate a significant effect between QOL domains and sex as evidence by physical domain (F 9.86, α .002), psychological domain (F 18.34, α .000), social domain (14.59, α .000), and environmental domain (F18.24, α .000). It is obvious that sex (independent variable) has had a real effect on the QOL (dependent variable). In general, we can say the detailed quality of life data in our study has shown significant differences between men and women in all aspects of quality of life domains. Our available data showed a clear, and statistically significant gender differences regarding quality of life. Men reported a significant improvement in general well-being (physical,

psychological, social, and environmental) in both case and control groups. Also men and women among control group reported a significant improvement in all domains compared with case group in both sexes. Overall, mean quality of life domains among the case group is less than the control group at all ages. These results differ with other previous studies, which have reported that the most important barriers which prevent blood pressure control is the side effect of anti hypertensive medication such as fatigue, dizziness, and sexual function, which in turn impaired patients activity of daily living and quality of life [118, 119,120].

9.4 Existence of seasonal pattern and the occurrence of stroke

In our study, we found clear evidence of a seasonal pattern for the development of stroke. The highest peak of occurrence was during autumn, and winter. These results support results of previous studies, which have reported the highest stroke incidence rates occurring during autumn [112], and winter [113]. However, other studies do not report evidence supporting seasonal variation in stroke rates [111].

9.5 Methodological considerations

9.5.1 Strengths of the study

This study is an epidemiological, a pair matched case-control study, which is the strengthen type of retrospective design and the most appropriate method to study etiology and clinical questions (187, 188).

An important strength of this study is the similarity between cases and controls with regard to extraneous variables, which enhanced the presumed cause of the disease.

Sophisticated statistical procedure (conditional logistic regression analysis) was used to test a hypothesized causal chain among a set of independent variables and stroke.

The sample size was adequate to carry out this study. The choice of a larger sample size and the potential inclusion of all registered cases in a certain area ensures a higher degree of confidence that the sample represents partly the population under study, decreases type II error (beta error), and increases the power of statistical tests (189).

Exclusion of some cases due to exclusion criteria has a powerful and positive impact on the study results. Seven subjects over 69 years old were excluded from the study to prevent a negative effect of age as a confounding variable on the quality of life (QOL). Ten subjects, who participated in the pilot study were excluded to prevent testing effect (the effects of taking pre-test on the

scores of post test) as a threat to internal validity [170]. Computer tomography scan of the brain is the main diagnostic procedure in case of stroke [3]. Excluding of subjects, who did not do computer tomography scan of the brain had a positive impact on the study results by preventing any confounding variables such as aneurysm, which may affect the dependent variable (stroke). High rate of inclusion of cases, and excluding certain subjects, who had a second attack of stroke, helped that only factors of non-compliance with the therapeutic regimen were regarded as potential independent variables with an effect on stroke as dependent variable. Exclusion criteria provided a method to control confounding factors.

9.5.2 Limitations of the study

Despite its strengths, the study has also some limitations such as:

1. Recall bias: The capacity of the memory 1 year before stroke might be affected by the stroke itself and this may lead to higher or poorer scores in the quality of life. We tried to minimize and overcome such problems by obtaining the information from both family and patients especially in stroke patients who had problems or were unable to communicate verbally with the interviewers. In addition, we used the patients' file or chart in case of ambiguous information.

2. Information bias: Structured interviews were used by trained interviewers to collect data, so the information is self-reported regarding fat, and salt diet, medication, health-care-follow-up, exercise, and smoking. We tried to minimize and overcome such problem by assessing the quality of data in the

early stage by test-retest methods to ensure the reliability of the information. Also the data values for key variables were examined to determine any anomalies, such as limited variability, extreme skew, or the presence of ceiling or floor effects.

3. Selection bias: Cases have been selected from the wards and via medical records. To minimizes and overcome a selection bias the patients' names were obtained twice independently from the Disease Registry Office, and from the ward where the patients were admitted. In addition, during the study, we always compared the background characteristics of the case and control groups to check for selection bias. Also other methods were used such as matching, homogeneity, and blocking to control extraneous variables.

Chapter 10

Conclusion

Managing hypertensive individuals at risk of stroke requires sustained enthusiasm by physician, nurse, patient, and family. There are many areas where intervention matters most such as smoking, hypertension, obesity, lack of exercise, psychological and environmental stressors, and dietary restrictions. These should be addressed energetically, explaining that life-long therapy will be required, with regular checks as necessary. Awareness that multiple drug therapy may be required is an area for education for both patient and physician. Putting into practice these ideas should be our daily work.

A pair matched case-control design was undertaken at the three main governmental hospitals, and administratively related primary health care clinics in Gaza Strip. All available discharge data of patients from the three main hospitals in Gaza Strip were screened for cases, and Controls derived from the same primary health care clinics where cases used to receive follow-up appointments before the development of stroke. The total sample of the case group was 112 subjects (58 men and 54 women) with stroke and history of hypertension, and the control group composed of 224 subjects (116 men and 108 women) matched with age, sex, period of duration with the therapeutic regimen, enrolment location, and with single history of hypertension. The main objectives of the study were to ascertain whether an association exists between non-compliance with the therapeutic regimen (Anti hypertensive medication, dietary restrictions of sodium, weight reduction, exercise program, follow-up health care, and smoking), and the development

of stroke among hypertensive patients, and to determine the risk factors which contribute to the development of stroke. Also we need to evaluate the differences in quality of life among case, and control groups one year before the study, and to assess the existence of seasonal pattern and the occurrence of stroke.

It was observed that lowering of blood pressure by lifestyle modifications and medication prevents hypertensive arteriolar stroke. Our study provided a firm knowledge base for controlling hypertension in order to decrease the incidence and risk of stroke. In addition, it provides a clear evidence of the effectiveness of pharmacologic (anti-hypertensive medication) and non-pharmacologic (weight reduction, exercise program, low salt diet, follow-up care and stop smoking) treatment in reducing the risk of stroke. There is a significant relationship between non-compliance to medication and development of stroke. A similar relationship is found between using excessive salt in meal, eating diet high in fat and development of stroke. While there is a clear and significant association between HLS and development of stroke considering the main effects without interaction terms. In addition, the same association present between HLS and development of stroke, but conditioned by not smoking and usage of excessive salt considering an interaction terms based upon backward selection. On the other hand, the analysis of variance shows no significant effect between the age and quality of life domains, but the significant association is present between sex and quality of life. In addition, the patients, who developed stroke, had less quality of life than the hypertensive patients, who did not develop stroke.

Overall quality of life and at all domains is less than in the German general population at the same domains. Also evidence was found between stroke development and seasonal pattern.

Chapter 11

Recommendations

11. 1 Policy and management

Stroke is a public health problem; it causes high morbidity, invalidism, and death. In addition, it can be prevented easily by controlling of hypertension through life style modifications. This thesis provides an outline of the existing state of compliance with the therapeutic regimen, and it makes suggestions for a community approach to prevent and control hypertension in order to prevent stroke development. Many major issues will be addressed: First, more attention must be directed toward development of an effective health education program at secondary and tertiary care facilities, based on sound theory by enhancing patient compliance to be with respect to their health behavior, and to have adequate knowledge concerning illness and treatment regimens. A second concern, shared by all, is the delineation of future directions for compliance research, along with the potential for application of these findings in clinical practice. A third concern is to provide the basis for appropriate public health intervention, epidemiological estimates of the prevalence of stroke and the level of risk factors leading to brain attack.

11.2 Implications for future research

More research studies are needed for a deeper understanding of the determinants of compliance with the therapeutic regimen mainly physical activity, obesity, over weight, stress, and smoking in order to prevent hypertensive complications such as stroke.

Due to some limitation and weakness of the study such as recall, and information biases, further research studies and recommendations are needed to:-

a. Examine the association between cigarette smoking and development of stroke.

b. Examine the relation between the level of physical activity and development of stroke.

c. Evaluate the effectiveness of antihypertensive therapy in preventing various types of stroke.

d. Evaluate the quality of life among compliance and non-compliance with the therapeutic regimen especially medication and life style modifications.

e. Determine the association between body size/weight (BMI) and fat distribution as predictors of stroke.

f. Determine the association between level of stress and development of stroke.

11.3 Implications for health promotion

The last part of this study focuses on recommendations and implications for health promotion that may have immediate or long term effect on the compliance with the therapeutic regimen among the Palestinian community in general. A health belief model, and behavior modification strategies, and social and psychological support should be involved in a large scale of any health education program. Much work remains to be done to identify elements of the client-provider relationship that is associated with

compliant behavior. Patient education, family counseling, and use of social support networks should be involved in any health education program to improve more compliance with the therapeutic regimen. Investment in program which aims to promote more compliance with the therapeutic regimen implies a long term cost-effective and not a too heavy burden on the Palestinian health system. Early detection and prevention of hypertensive complications implies early intervention at low cost comparing to the cost of hypertension related complications such as, the cost of treating stroke, renal failure, ischemic heart disease and its implications. New preventive public health strategies must be applied to prevent these costly health conditions.

Improving and increasing compliance with the therapeutic regimen in Palestine is not the responsibility of the physicians, nurses, pharmacist, and dietitian, but it is the responsibility of the whole community including, patient, family, and media and information. All of them should play effective role and cooperate with each others in order to achieve an optimal outcome. The health education department in the Ministry of Health should take the leading role and initiate coordination between the different ministries, and community institutions in order to setup a national hypertensive health education program which aims at improving compliance with antihypertensive medication, healthy behavior, and life style to maintain well being of hypertensive patients.

Also adequate number of the qualified doctors, nurses, psychologist, and sociologist which should be involved in health education due to the crowded, which happens in the primary health care clinic. Because of high prevalence

of hypertension among population in Gaza strip, there should be justifiable concern about the knowledge and misconceptions of the disease in order to control blood pressure and prevent the incidence of stroke and side effect of medication by less cost. In addition, preventive and general therapeutic measures must be forthcoming by ascertaining more precisely the role of weight control, dietary factors modifications (salt and fat), stop smoking, and performance of exercise.

Other suggestions for increasing patient compliance with antihypertensive medication should be involved in a health education program such as patients' education about the importance of following drug regimen as prescribed, reconfirmation of follow-up appointment by telephone, and asking for compliance obstacles. However, other concerns should be taken regarding lifestyle counseling, because it is effective for some patients especially in mild and moderate hypertension, and it is probably not desirable to maintain hundreds and thousand of people in Gaza Strip on decades of drug treatment, if there are safe and inexpensive alternatives treatments. It is suggested that, once an individual with hypertension is identified, evaluated clinically, and treated, the control of the problem and the compliance of the patient will be ensured only by a clear understanding of the patient about his disease, and by continuing interest of the physician and allied health personal in the patient and his condition. It is recommended that studies must be initiated to facilitate better understanding of the problems of compliance. Successful and long-term prevention strategies of stroke using a control of hypertension in Gaza Strip should be based on an effective community health program. This

requires a full cooperation, and involvement of all individuals such as health personal, patients, family, volunteer, and helpers.

The main implication for health promotion is to activate, and expand the nurses' role in the management of the hypertensive patient to have greater impact in patient care management, because the nurses see the patient for the longest periods and act as coordinators of their care. As resource persons, we answer the patients' questions; identify their problems, and performing nursing diagnosis. We are assessing, planning, implementing, and evaluating compliance with therapeutic regimen as well as response to it. Also in developing countries especially in Gaza Strip, where a major an increased incidence rates of cerebrovascular disease are projected to occur, the prevention of hypertension through population-based measures to improve life style is strongly recommended.

CHAPTER 12

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APPENDIXES

List of Appendixes

1. The questionnaire
2. Witness Form
3. A form of authorization to conduct the study
4. General standard of quality of life among German population

Appendix 1

Questionnaire

Stroke and non-compliance with the therapeutic Regimen among hypertensive patients In Gaza governorates 1/1/2001-31/12/2001 (Part one)

I- Personal information:

1- Diagnosis: stroke and history of hypertension ☐ Hypertension ☐

2- The name of the hospital / clinic:

Shefa hospital ☐ Nasser hospital ☐ European hospital ☐

3- Age in years:

40-45 ☐ 46-51 ☐ 52-57 ☐ 58-63 ☐ 64-69 ☐

4- Address: Gaza ☐ Mid-zone ☐ South ☐

5- Sex: Male ☐ Female ☐

6- Weight: (Last year) ☐

7- Height: ☐

8-Marital status: Married ☐ Single ☐ Divorce ☐ widow ☐

9- Number of children: 0 ☐ 1-3 ☐ 4-6 ☐ 7-9 ☐ 10 or over ☐

II-Medical information:

10 - How long do you have a history of hypertension?

2-7 ☐ 8-13 ☐ 14-19 ☐ 20-25 ☐ 26-31 ☐

11- When did you start your therapeutic regimen: ----------

12- Do you have history of other diseases?

Yes ☐ No ☐

13- If yes, please explain:

III- Socio-economic information

14- Level of education

Nil ☐ Primary school ☐ Preparatory school ☐ Secondary school ☐

University degree ☐ more than that ☐

15- Average income per month in US. $

Less than 200 $ ☐ 200-350$ ☐ 360-550$ ☐ 560-750$ ☐ over 750$ ☐

IV- Compliance to therapeutic regimen

How have you experienced these things in the last year?

a) Anti – hypertensive medication:

16- Did you take your medication as prescribed?

Yes ☐ No ☐

17- Did you take your medication at proper time?

Yes ☐ No ☐

18- Did you run out of pills even for a single day?

Yes ☐ No ☐

b) Dietary restrictions of sodium and fat:

19- Did you use excessive salt in cooking or at meals?

Yes ☐ No ☐

20- Did your family prepare a special diet for you, which is low in salt?

Yes ☐ No ☐

21- Did you eat diet high in fat such as milk, butter, margarine, cream, eggs, cheese and meat?

Yes ☐ No ☐

c) Weight reduction:

22- Did you involve in a regular program of weight reduction?

Yes ☐ No ☐

d) Exercise program

23- Did you involve in a regular program of exercise such as walking?

Yes ☐ No ☐

e) Follow-up health care:

24- Did you check your blood pressure regularly?

Yes ☐ No ☐

25- Did you keep follow-up clinic or physician appointment?

Yes ☐ No ☐

f) Smoking:

26- Do or did you smoke?

Yes ☐ No ☐

27- If yes, how many cigarettes per day?

1-10 ☐ 11-20 ☐ 21-30 ☐ 31-40 ☐ over 40 cigarette ☐

28- How long did you smoke?

1-4 years ☐ 5-8 years ☐ 9-12 years ☐ 13-16 years ☐ 17-20years ☐

over 20 years ☐

29- If no, did you ever smoke?

Yes ☐ No ☐

g) Psychological and environmental stressors

How much did you suffer in the last year?

Key values

0= No
1= Little
2= Sometimes
3= Strong
4= Very strong

30- Criticize everything too much	**0**	**1**	**2**	**3**	**4**
31- Feeling loneliness	**0**	**1**	**2**	**3**	**4**
32- Nervousness or sleeping disturbances	**0**	**1**	**2**	**3**	**4**
33- Uncomfortable feeling when People are watching you	**0**	**1**	**2**	**3**	**4**
34- Feeling that, you did not like to eat or drink in public	**0**	**1**	**2**	**3**	**4**

V- Knowledge and misconception of disease

According to your knowledge in the last year….

35-Could you explain the causes of hypertension?

Unknown, but heredity plays an important role ☐ bacteria ☐

Virus ☐ I do not know ☐

36-Could you explain the complications of hypertension?

Stroke ☐ Tuberculosis ☐ No complications ☐ I do not know ☐

37- Did your knowledge change about the causes of hypertension right now?

Unknown, but heredity plays an important role ☐ bacteria ☐

Virus ☐ I do not know ☐

38- Did your knowledge change about the complications of hypertension right now?

Stroke ☐ Tuberculosis ☐ No complications ☐ I do not know ☐

39- Is there a possibility of total cure for hypertension?

Yes ☐ No ☐

40- Could the treatment be stopped, if blood pressure was controlled?

Yes ☐ No ☐

VI- Time distribution of stroke:

41- Do you know the time of onset of stroke?

Yes ☐ No ☐

42- If yes, is it in

*Autumn ☐

*Winter ☐

*Spring ☐

*Summer ☐

VII) Body mass index (calculated by physician)

43- Body mass index:

20-24.9 ☐ 25-29.9 ☐ 30-40 ☐ Over 40 ☐

WHOQOL Questionnaire

(Part 2)

Instructions

This assessment asks how you feel about your quality of life, health or other areas of your life. **Please answer all the questions**. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

Please keep in mind your standards, hopes, pleasures, and concerns. We ask that you think about your life **in the last year.**

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

		Very poor	Poor	Neither poor nor good	Good	Very good
1-	How would you rate your quality of life?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied
2-	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about how much you have experienced certain things in the last year.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3-	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
4-	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5-	How much do you enjoy life?	1	2	3	4	5
6-	To what extent do you feel your life to be meaningful?	1	2	3	4	5
		Nat at all	A little	A moderate amount	Very much	Extremely
7-	How well are you able to concentrate?	1	2	3	4	5
8-	How safe do you feel in your daily life?	1	2	3	4	5
9-	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about how completely you experience or were able to do certain things in the last year.

		Not at all	A little	Moderately	Mostly	Completely
10-	Do you have enough energy for every day life?	1	2	3	4	5
11-	Are you able to accept your bodily appearance?	1	2	3	4	5
12-	Have you enough money to meet your needs?	1	2	3	4	5
13-	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14-	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5
		Very poor	**Poor**	**Neither poor nor good**	**Good**	**Very good**
15-	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how good or satisfied you have felt about various aspects of your life over the last year.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16-	How satisfied are you with your sleep?	1	2	3	4	5
17-	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18-	How satisfied are you with your capacity for work?	1	2	3	4	5
19-	How satisfied are you with yourself?	1	2	3	4	5
20-	How satisfied are you with your personal relationships?	1	2	3	4	5
21-	How satisfied are you with your sex life	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
22-	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23-	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24-	How satisfied are you with your access to health services?	1	2	3	4	5
25-	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to how often you have felt or experienced certain things in the last year.

		Never	Seldom	Quit often	Very Often	Always
26-	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Did someone help you to fill out this form?

Yes ☐ **No** ☐

How long did it take to fill this form out? _____

Did you have any comments about the assessment?

……

……..

THANK YOU FOR YOUR HELP

Appendix 2

Witness form

Stroke and non-compliance with the therapeutic

Regimen among hypertensive patients

In Gaza governorates

1/1/2001-31/12/2001

This questionnaire consists of many questions that measure compliance and non-compliance with the therapeutic regimen in patients with stroke and hypertensive patients without stroke. In addition, it measures the quality of life in hypertensive patients with stroke and hypertensive patients without stroke one year before the study.

Dear Patient:

1- This study is undertaken to ascertain whether an association exists between non-compliance with the therapeutic regimen and development of stroke among hypertensive patients, to determine the risk factors which contribute to the development of stroke, to evaluate the differences in quality of life among the patients with stroke and history of hypertension (case group), and hypertensive patients without stroke (control group) one year before the study, and to assess the existent of seasonal pattern and the occurrence of stroke.

2- This study will benefit in improving the health condition in hypertensive patients through emphasizing their quality of life, compliance with the therapeutic regimen, and avoidance of the disease complications, especially stroke.

3- Participation in this study will not expose the patient to any danger or complications that may affect his health condition negatively.

- The information that is collected with this questionnaire will be used

  only for scientific study purposes

- Confidentiality will be guaranteed.

- I hope you will express your answer honestly.

Researcher

Yousef Aljeesh Patient's Signature